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ANNUAL REPORT
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Polytechnic Society.

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Yours sincerely
C. Lemon

SIR CHARLES LEMON, BART., M.A., F.R.S.
First President Royal Cornwall Polytechnic Society.

(1833-07).



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OF THE

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Those marked with an Asterisk are Members of the Council.

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Acland, Mrs. H. D., Chy-an-Mor, Gyllyngvase, Falmouth	...	5	0	
Anderton, Mrs. E. D., Oakroyd, Falmouth	...	1	1	0
Armstrong, Miss Frances, Stratton, Falmouth	...	5	0	
Armstrong, Miss S. P., Stratton, Falmouth	...	5	0	
Bain, F. D., Fairfield, Illogan, Redruth	...	10	6	
Barclay, Miss R., Carenver, Falmouth	...	5	0	
Barnes, Mrs. Jocelyn, 1, Tehidy Terrace, Falmouth	...	5	0	
*Basset, A. F., Tehidy, Camborne	...	1	1	0
Bearne, Dr. Austen A., Boslowick, Falmouth	...	10	0	
Bearne, Mrs. A. A., Boslowick, Falmouth	...	5	0	
*Beauchamp, E. B., Trevince, Redruth	...	10	0	
Bell, A., M.A., Hillside, Camborne	...	10	0	
Bennett, E. J., Roskear, Camborne	...	10	0	
Bickle, Jebus, Beacon Hill, Camborne	...	10	0	
Blackford, Oscar, Truro	...	10	0	
Blamey, Dr. J., Penryn	...	10	0	
Blamey, Mrs. J., Penryn	...	5	0	
Blamey, Mrs. T. R., Pensilva, Falmouth	...	5	0	
Blight, Mrs. W., Green Bank, Falmouth	...	5	0	
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Blight, Bryan, Green Bank, Falmouth	...	5	0	
*Bolitho, T. Bedford, Trewidden, Buryas Bridge, R.S.O.	...	1	0	0
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Borlase, Miss Caroline, Castle Horneck, Penzance	...	5	0	
*Bowles, F. J., Lansdowne Road, Falmouth	...	10	0	
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Burns, Rev. Father, St. Mary's, Falmouth	...	10	0
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Byne, Mrs. Loftus, 48, Kimberley Road, Falmouth	...	5	0
Cadwell, T. H., Bassett Road, Camborne	...	10	0
Carlyon, Rev. Philip, M.A., Pennance House, Falmouth	...	10	0
*Carlyon, Harold B., M.A., Pennance House, Falmouth	...	10	0
Carne, G. N., Western Terrace, Falmouth	...	10	0
Chegwidden, F., Market Street, Penryn	...	10	0
Chellew, T. J., Merryn, St. Ives	...	10	0
Churchill, J. Spencer, 8, Gyllyngvase Terrace, Falmouth	...	10	0
Clarke, Miss S. J., 18, Florence Terrace, Falmouth	...	5	0
*Clifden, Rt. Hon. Viscount, Lanhydrock, Bodmin	...	1	1 0
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Collins, J. R., St. Nicholas, Bodmin	...	10	0
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Coode, Harold, Trerose, Mawnan	...	10	0
*Corin, Philip B., M.I.M.M., M.I.M.E., Tolver Road Penzance	...	10	0
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Cox, William, Roskear, Camborne	...	10	0
Cozens, Frank A., 19, King Street, Truro	...	10	0
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*Davey, F. Hamilton, F.L.S., St. Piran, Perranwell Station	...	10	0
Davey, the late Richard, Holyrood, Falmouth	...	1	1 0
*Daubuz, J. C., Killiow, Truro	...	1	1 0
Deakin, Mrs. A., Newland, Capri, Falmouth	...	5	0
Deakin, Miss Newland, Capri, Falmouth	...	5	0
Downing, C. Vincent, 43, Church Street, Falmouth	...	10	0
*Dunn, Matthias, Newlyn, Penzance	...	10	0
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Enys, Miss, Enys, Penryn	...	10	0
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Farley, Mrs. Turner, Trefusis, Falmouth	...	5	0
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Fitz Gerald, Major-General C., Lansdowne, Falmouth	...	10	0
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Ford, J. A., Kennall Vale, Perranwell Station	...	10	0
Ford, Mrs. J. A., Kennall Vale, Perranwell Station	...	5	0
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*Foster, Richard, Lanwithan, Lostwithiel	...	10	0
*Fox, George Henry, Wodehouse Place, Falmouth	...	1	0 0
*Fox, Mrs. G. H., Wodehouse Place, Falmouth	...	10	0
*Fox, Cuthbert L., Wodehouse Place, Falmouth	...	10	0
*Fox, Howard, F.G.S., Rosehill, Falmouth	...	1	0 0
Fox, Mrs. H., Rosehill, Falmouth	...	5	0
Fox, Miss Ivy, Rosehill, Falmouth	...	5	0
Fox, Miss Stella, Rosehill, Falmouth	...	5	0
Fox, C. Masson, Woodlane Cottage, Falmouth	...	10	0
*Fox, Robert, Grovehill, Falmouth	...	1	0 0
Fox, Mrs. R., Grovehill, Falmouth	...	10	0
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*Fox, R. Barclay, Florence Place, Falmouth	...	10	0
Fox, Mrs. R. B., Florence Place, Falmouth	...	5	0
*Fox, Wilson L., F.R.Met.Soc., Carmino, Falmouth	...	1	1 0
*Fox, Mrs. Wilson L., Carmino, Falmouth	...	5	0
Fox, Miss A. S., Wodehouse Place, Falmouth	...	5	0
Freeman, Sons and Co., Penryn	...	1	1 0
Gardenner, F. J., Tehidy Road, Camborne	...	10	0
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*Gill, John, F.C.S., Gwealhellis, Helston	...	10	0
Gill, R. D., Penlu, Tuckingmill	...	10	0
Gill, W. N., Comprigney, Truro	...	10	0
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*Jenner, Henry, F.S.A., Bospowes, Hayle	...	10	0
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Row, Miss E. J., Constantine, Penryn	...	5	0
Rowe, William, Falmouth	...	10	0
Rowe, Arthur, Bodinnick, Daniel Road, Truro	...	10	0
Rowe, Capt. Jas., Pendarves Road, Camborne	...	10	0
Rowe, Alfred, Commercial Street, Camborne	...	10	0
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*Shopland, Thomas, B.A., Clinton Road, Redruth	...	10	0
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Sharpe, Mrs. W. W. J., 17, Florence Terrace, Falmouth	...	5	0
Sharpe, Miss, Belmont Terrace, Falmouth	...	5	0
*Smith, Sir George J., Treiske, Truro	...	10	0
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St. Levan, Lady, St. Michael's Mount, Marazion	...	1	1 0
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*Stephens, C. R., Kernick, Penryn	...	10	0
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Stephens, F. J., F.G.S., Portscatho, Geraus, Falmouth	...	10	0
Stewart, Mervyn J., 7, Stratton Terrace, Falmouth	...	10	0
Stewart, Mrs. M. J., 7, Stratton Terrace, Falmouth	...	5	0
Strongman, F., 6, Trevethan Terrace, Falmouth	...	10	0
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Thomas, C., Penryn	...	5	0
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Tilly, Alfred, The Glen, Porthtowan	...	10	0
Tippett, R. H., Truro	...	10	0
Tonkin, Mrs., Penwarne, Falmouth	...	5	0
Town, Wm., Gyllyngvase House, Falmouth	...	10	0
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*Trefusis, Lieut.-Col. the Hon. H. W. F., Porthgidden, Devon	...	10	0
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*Trestail, Nicholas, A.M.I.C.E., Claremont Road, Redruth	...	10	0
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Trewake, W., Woodlane, Falmouth	...	10	0
Truro, Rt. Rev. Lord Bishop of, Lis Escop, Truro	...	1	1 0
Tuke, Henry S., A.R.A., Swanpool, Falmouth	...	10	0
Tunstall-Behrens, B., Porth-en-alls, Marazion	...	10	0
Tweedy, Mrs. R. M., Lansdowne, Falmouth	...	5	0
Tweedy, Miss, Lansdowne, Falmouth	...	5	0
*Tyack, Charles E., Trevu, Camborne	...	10	0
Vallentin, Rupert, F.L.S., Carwinion Vean, Mawnan	...	10	6
Vallentin, Mrs. R., Carwinion Vean, Mawnan	...	10	6
Venning, Sir Edgcumbe, F.R.C.S., Lamorva, Falmouth	...	1	1 0
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Vivian, John, Basset Road, Camborne	...	10	0
Vyner-Bradford, Mrs., The Cottage, Flushing, Falmouth	...	5	0
*Vyvyan, Rev. Sir Vyell, Bart., Trelowarren Mawnan-in-Meneage, R.S.O.	...	1	0 0
*Vyvyan, Col. Courtenay, C.B., Tremayne, St. Martin, S.O.	...	1	1 0
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Watson, W. N., Woodlane, Falmouth	...	10	0
Watson, Mrs. E., Woodlane, Falmouth	...	5	0
Wickett, Tom, Ford House, Redruth	...	10	0
*Wickett, James, Clinton Road, Redruth	...	10	6
Wilkie, Col. David, Coolmore, Falmouth	...	10	0
Wilkie, Mrs., Coolmore, Falmouth	...	10	0
Wilkinson, W. Fisher, Camborne	...	10	0
*Williams, J. C., Caerhays Castle, St. Austell	...	2	2 0
Williams, Percival D., Lanarth, St. Keverne	...	1	1 0

Williams, H. Harcourt, Pencalenick, Truro	...	1	0	0
Williams, Miss Louisa M., Belle Vue, Falmouth	...	5	0	
*Willmore, Arthur, 4, Florence Terrace, Falmouth	...	5	0	
Willmore, Mrs., 4, Florence Terrace, Falmouth	...	5	0	
Willmore, Miss, 4, Florence Terrace, Falmouth	...	5	0	
Willmore, Charles, 4, Florence Terrace, Falmouth	...	5	0	
Woolcock, Mrs. B. B. Chellev, Point, Devoran	...	5	0	
Worth, R. K., Lemon Street, Truro	...	10	0	

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1911-12.**

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Fox, Mrs. A. Lloyd, 17, Campden Hill Gardens, Kensington, W.	...	1	1	0
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Hodgkin, Thomas, D.C.L., Litt.D., Barmoor Castle, Beal	...	2	2	0
Ivey, J. H., c/o Aramyo-Franche & Co., Quechesla, Bolivia	10	6		
*Layland-Barratt, Sir F., M.A., LL.B., 68, Cadogan Square, London, S.W.	...	1	0	0
Marks, Sir G. Croydon, M.F., 17, Southampton Buildings, Chancery Lane, E.C.	...	1	1	0
Meyerstein, E. W., 1, Draper's Gardens, Throgmorton St., E.C.	10	0		
Morgan, G. Hay, M.P., 4, Harcourt Buildings, Temple, E.C.	1	1	0	
*Pearce, Rd., Ph.D., F.G.S., 6, Beach Lawn, Waterloo, Liverpool	...	1	1	0
Pease, Miss, St. Michael's Cottage, Leighton Buzzard	...	1	1	0
Rich, Wm., M.I.M.M., 175, St. James's Court, Buckingham Gate, London	...	1	0	0
Rowe, J. Hambley, M.B., 88, Horton Grange Road, Bradford,	10	0		
Ruthenburg, M., 98, Leadenhall Street, London	...	10	0	

LIST OF DONORS AND SUBSCRIBERS.

xv

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NOTE.—The Secretary will be obliged if the members will inform him of any errors or necessary alterations in this List.

The Annual Meeting.

THE Seventy-ninth Annual General Meeting of the Royal Cornwall Polytechnic Society was held at Falmouth on Tuesday, February 13, 1912. In the absence of the president and Mr. C. S. Goldman, M.P., who had consented to take his place, the chair was occupied by Mr. H. D. Acland, F.G.S. The gathering included Canon F. H. Hichens, Colonel D. Wilkie, Captain Arthur Rogers, Lieut. Mervyn J. Stewart, Mr. L. St. George Byne, Mr. E. Kitto, F.R. Met. Soc., Mr. James Wickett, Mr. J. B. Phillips, Mr. Cuthbert L. Fox, Mr. Wilson L. Fox, F.R. Met. Soc., Mr. J. H. Collins, F.G.S., Mr. Henry Jenner, F.S.A., Mr. H. Brown, Mr. C. Phillips, Mr. W. W. J. Sharpe, Mr. E. W. Newton, F.G.S. (secretary), Mr. E. J. Moseley (assist. secretary), Mrs. Robert Fox, Mrs. R. Barclay Fox, Mrs. Byne, Mrs. Hyde, Mrs. Kitto, Mrs. Wilson L. Fox, Mrs. T. Webb, Mrs. H. D. Acland, Mrs. J. Gilbert Stephens, Mrs. J. E. Blight, Mrs. Chellew-Woolcock, Mrs. G. H. Fox, Mrs. Hichens, Miss E. B. Blight, Miss E. M. Stephens, Miss A. S. Fox, Miss M. Rogers, and Miss A. M. Phillips.

Letters of apology for non-attendance were received from the president, Rev. W. F. C. Rogers, Sir John Alleyne, Sir Arthur P. Vivian, Colonel Courtenay B. Vyvyan, Colonel the Hon. H. W. Forbes Trefusis, Captain E. W. Creak, C.B., F.R.S., Captain J. P. Rogers, Mr. C. S. Goldman, M.P., Mr. J. D. Enys, F.G.S., Mr. H. B. Fox, Mr. F. Hamilton Davey, F.L.S., Mr. Horton Bolitho, Mr. Howard Fox, F.G.S., Mr. F. J. Bowles, Mr. E. W. Rashleigh, Mr. R. H. Kirton, Miss Paull and Miss Pease.

The minutes of the last Annual General Meeting, held on February 14, 1911, were read and confirmed; and the Report

of the Council for 1911 was adopted, on the motion of the chairman, seconded by Mr. J. H. Collins.

Presenting the Statement of Accounts for 1911, Mr. Newton said the Society started last year with a debit balance of £19 17s. 4d., which was automatically removed in a day or two, when members' subscriptions came in. Expenses had considerably increased in many respects, particularly with regard to alterations to the Hall, the whole of which had not been covered by the Renovation Fund. At the close of the year there was a credit balance of about £100, which could not be regarded as profit, because the Society was not a profit-making concern. If there was any money in hand they found some use for it in order to benefit the county. Members could rest assured that the small balance in hand was ear-marked for the expenses of the next exhibition.—The accounts were adopted on the motion of Lieut. Stewart.

Mr. James Wickett proposed that the following gentlemen be elected in the place of the four retiring vice-presidents:—Hon. T. C. R. Agar Robartes, M.P., Mr. C. S. Goldman, M.P., Mr. Henry Jenner, F.S.A., Captain Arthur Rogers, R.N.R.—Mr. C. L. Fox seconded, and the resolution was unanimously carried.

On the resolution of Mr. Wilson L. Fox, seconded by Mr. E. Kitto, the following were elected members of the Society:—Sir Edgcumbe Venning, F.R.C.S., Falmouth; Mr. and Mrs. Loftus St. George Byne, Falmouth; Mrs. Vyner Bradford, Flushing; Dr. A. A. and Mrs. Bearne, Boslowick, Falmouth; Mr. and Mrs. T. Bunt, Falmouth; Canon Fred Hichens and Miss Margaret Hichens, Falmouth; Mr. Walter Rogers, M.A., Falmouth; Mr. E. T. Ford, M.A., Pengreep, Perranwell Station; Mr. and Mrs. J. A. Ford, Kennall Vale, Ponsanooth, Perranwell Station; Mr. George S. King, Devonport; Mr. F. Steinhoff, London; Mr. T. C. F. Hall, Camborne; Mr. and Mrs. F. C. Daukes, Pencaer, Falmouth; the Misses Ringer (2), Falmouth; Colonel George Mansel, C.M.G., Arwenack, Falmouth; Mr. J. Spencer Churchill, Falmouth; Mr. and Mrs. Herman Broad, Falmouth.

Mr. E. Kitto, in moving the election of Sir Joseph Larmor as Honorary Member, and Miss Paull, Mr. H. Jenner, Colonel C. B. Vyvyan, and Lieut.-Col. the Hon. H. W. Forbes Trefusis as members of the Council, said their list of Honorary Members contained some illustrious names, and the name of Sir Joseph Larmor, who was secretary of the Royal Society, stood in the front rank of scientists of this country. The Falmouth Observatory had received a good many grants, amounting in the aggregate to several hundreds of pounds, from the Royal Society for magnetic work, and they had the sympathy and co-operation of Sir Joseph. Those who were being elected new members of the Council were greatly interested in the Polytechnic Society, especially Mr. Jenner, who did such good service on the occasion of their summer excursion last year.—Colonel Wilkie seconded, and it was carried.

Presenting the Report of the Observatory Committee, Mr. Wilson L. Fox gave details of the more remarkable meteorological phenomena of the past year. He described it as a year of extraordinary character. The number of hours of bright sunshine was 2,055, being 283 in excess of the mean. This number during the last thirty years was only twice exceeded, viz., in 1887, when there were 2,074 hours, and in 1893, when there were 2,088 hours. There were 346 hours in July, which was the greatest number in any one month since 1881, when sunshine records commenced. There were 309 sunny days (against a record of 323 in 1887), being four above the average. The total rainfall was 40·5 inches, 1·7 inches below the mean for the last 29 years. Of this total 15 inches fell during the first six months, and 25 in the last six. Of the 25 inches, over 14 fell in November and December, and 9·19 inches in the latter month, which had only been exceeded on three occasions. May was the driest, only 1·04 inches falling. January and July came next, with 1·66 and 1·14 respectively. In a period of 42 days, ended June 14, only ·06 of an inch fell, due to a slight thunderstorm. Again, in July no rain fell for 28 days 9 hours, and in August for 18 days, with the exception of ·03 of

an inch. These drought periods in three successive months were unique in the annals of local rainfall. In July the mean relative humidity was 68, which was a record for that month. At 9 a.m. on the 13th the humidity was only 35. This showed a dryness of air in excess of any previous record at Falmouth. The range of temperature for the year was 53·5. This contrasted with 86 in the Midland counties, and demonstrated afresh the equable climate of the South-West of England. The extreme maximum of 81·5 occurred on July 14, and was the highest recorded temperature for that month since 1885, when 82·5 was registered. The next highest reading in 1911 was 78·1, on September 5, which was a record. These maxima were in striking contrast to the very high temperature of some other districts of England, especially those of the South and East, where shade temperatures of over 90 were recorded during July and August, and in the latter month rose to 100° at Greenwich, the highest ever recorded in the British Isles. This should effectually correct the popular fallacy that the south coast of Cornwall is hot in summer.

The report was adopted, on the motion of Mr. Fox, seconded by Captain Arthur Rogers. Supporting, the chairman remarked that the Society felt deeply indebted to Mr. Fox for his valuable data, and the enthusiasm he had displayed in connection with the Observatory, and hoped the members would always have the pleasure of Mr. Fox's experience in this direction.

In the absence of Mr. F. Hamilton Davey, the Librarian's Report was read by Mr. H. Jenner. Moving its adoption, Mr. Jenner said he took that opportunity of thanking the Council for making him a vice-president of the Society. He felt greatly gratified to come back to his own county after so many years' absence and be so well received.—The Rev. Father Burns seconded, and said he heard with gratification that they had such a well-equipped Library.

Mr. Brown, principal of the Falmouth Art School, proposing the election of Mr. Moseley as the hon. secretary of the Cornwall

Art Union, said he believed he could claim a certain relationship to that Society because the building of the Falmouth School of Art was erected to the memory of the same good lady to whom that Society owed its origin, and he could ask for their assistance and sympathy with confidence because he saw that one of the chief aims of that Society was to encourage the study of drawing in its relation to fine and applied art. Since coming there in October last, fresh from the Royal College of Art, where he studied for four years after teaching for several years in some large industrial towns and studying art on the Continent, he had given all his attention to the teaching of drawing as it was in Falmouth, and he had come to a definite conclusion about what it was, and what it should or might be to its great advantage, and also what many other towns in the country had found to be advantageous. In the first place, he was anxious to dispel the notion that an art school was only a place where young people went who wished to become artists. It was a popular fallacy. He would be the last to depreciate the study of fine art, but he had to remember that a large portion of his salary came from the Government, for which he was expected to help the industries of the country and to help to train intelligent citizens and workmen. In order to be able to carry out this work, the art master should have charge of the drawing in both primary and secondary schools, giving every boy and girl the benefit of his wide experience and knowledge of this special subject, thus getting in touch with those children who possessed more than ordinary ability. Only by this means was it possible to prevent that great wastage which was now continually taking place when boys and girls left school. By this means one would be able to follow their career, and perhaps keep in touch with them during those years of their lives when they were inclined to waste valuable time and walk the streets, as they now did to such a large extent. They were told, and rightly, he thought, that the war of the future would be a commercial war, not a war of Dreadnoughts, etc., and with the ever-increasing

facilities now offered all the world over, by such societies as the Cornwall Polytechnic Society, the County Council, and other educational bodies, manufacturers expected, and justly expected, a more intelligent class of young persons to compete for employment. Many teachers did very good work in the teaching of drawing in elementary schools, but one could not expect them to be art masters, and great advantage might be gained by a closer connection being maintained between the primary and secondary schools and the art school, and by this means help to make the institution over which he had the honour to be principal a real power for good in Falmouth and district.

The election was agreed to, and the usual votes of thanks were accorded.

Report of the Council for 1911.

IN presenting their report for 1911 your Council are pleased to state that much valuable work has been done during the past year, and that the Society has maintained its time-honoured reputation.

The renovation of the Polytechnic Hall has been carried out, including the reseating of the gallery, improved staircases and emergency exits. This has been done in accordance with the requirements of the Cornwall County Council, and to the satisfaction of the county surveyor.

Your collection of oil paintings, which form a valuable series of Cornish worthies, has been very carefully restored by the late Mr. W. A. Rollason, and is now hung in the Society's Library. The cost of this work has been defrayed by a special fund of £242 12s. 0d., liberally subscribed by members of the Society for this purpose and for the re-decoration of the Hall.

The Summer Meeting was opened on July 11, with a *conversazione*, when your esteemed president, Dr. Hodgkin, delivered a very interesting and much appreciated lecture on Australia and New Zealand. Miss L. Violet Hodgkin exhibited a valuable collection of water-colour studies of places of interest visited during a trip to Australia in 1909. This was supplemented by a number of beautiful paintings of plants, birds, and other objects by Mrs. Hodgkin. The two contributions occupied the whole of one side of the gallery, and proved one of the outstanding features of the Meeting. Your Council felt greatly indebted to both Mrs. and Miss Hodgkin for their kind interest and assistance, and the First Silver Medal of the Society was awarded to each of these ladies for their exhibits.

The excursion on the following day was a great success; it was attended by about fifty members, including the president and Mrs. Hodgkin. The weather was ideal. The first stop was at Perran Round, where Mr. Henry Jenner, F.S.A., gave a short explanation of the old amphitheatre.

A brief journey then brought the party to the famous Oratory of St. Piran, which, with the ruins of St. Piran's house, was inspected. Mr. Jenner there read a descriptive and very interesting paper, after which the party drove to Perranporth, where luncheon was provided on the beach.

In the afternoon St. Agnes was visited, and by the courteous invitation of Mr. J. H. Collins, F.G.S., (a former secretary of your Society) and his co-directors, the visitors were shown over Wheal Kitty Mine. Subsequently they were entertained at tea in the Account House, thus closing a most instructive and enjoyable day. The president's lecture, and Mr. Jenner's and Mr. Collins's papers will appear in the Annual Report.

On Thursday, July 13, demonstrations were given in the Polytechnic Hall on the cultivation of sugar beet in Cornwall. Mr. Sigmund Stein lectured on the subject in the evening, when the chair was taken by the president. A summary of this lecture will also appear in the Annual Report.

The Sugar Beet Founders', Ltd., sent a complete exhibit of appliances and products illustrating the whole process of beet sugar production. This was presided over and explained by Mr. W. J. Hosken, of Pulsack Farm, Hayle, a pioneer in sugar beet culture in Cornwall. Diplomas of Honour were awarded to the Sugar Beet Founders', Ltd., for their exhibit, and to Mr. Hosken for the interest he had taken in the subject locally.

There was on exhibition a display of work by the students in the classes for Technical Instruction of the Cornwall County Council, under the superintendence of Mr. John Gill, F.C.S., their secretary. The importance of the exhibits led the Com-

mittee to open the Polytechnic Hall to the public on the last two days of the Meeting.

A number of valuable books have been added to your Library, many volumes have been bound, and the books have been rearranged and classified.

At the Meeting of the Corresponding Societies of the British Association, held at Portsmouth, the Society was represented by Mr. Wilson L. Fox, F.R. Met. Soc. There were two meetings of the delegates, both of which he attended. The first was on August 31, to hear the address of Prof. J. W. Gregory, F.R.S., (the president of the Conference), on 'The Scientific Misappropriation of popular terms.' It was full of illustrations of the practice by various branches of science, *e.g.*, the word 'rock' (the various uses of which he characterised as 'another triumph of dauntless logic') geologically speaking includes loose sand, clay, peat, etc., which are diametrically opposed to the popular idea of a rock, the essential quality of which is firmness, as in the parable of the man who built his house upon a rock. Mr. Wilfred M. Webb read a paper on the 'Protection of Plants'; the increasing necessity of the preservation of rare specimens of these and of birds and insects was emphasized. A paper on the Distribution of Fungi by Mr. Harold Wager was accompanied by an exhibition of numerous beautiful coloured drawings.

The work of the Falmouth Observatory, in both the departments of meteorology and terrestrial magnetism, has been continued without intermission. Circumstances of grave importance have arisen during the past year which have engaged the serious attention of the Observatory Committee. Much time and thought have been given both here and in London to a consideration of the situation which has presented itself. The matter is at present being considered by the scientific authorities by whom the Observatory has been mainly supported, and their decision may have a far-reaching effect on the future of the Falmouth Observatory.

Your Council has decided to hold this year's Exhibition at Falmouth, from August 27 to 31 (inclusive). The special feature will be modern improvements and inventions in electrical appliances.

To the regret of the Council the Society has lost several members by death during the year, including some of its most esteemed and valued supporters :

April 16. W. A. Rollason, F.E.S., who took an active interest in the work of the Society, and was hon. secretary of the Art Union of Cornwall.

May 5. William Michell Grylls, for many years an active member of the General Committee and judge at the Exhibitions. He was elected a vice-president in 1890.

June 30. Mrs. J. Jope Rogers, widow of John Jope Rogers, M.P., and a member for fifty years. She was one of the oldest supporters of, and a strenuous worker for, the Royal Cornwall Polytechnic Society. A life-long associate and intimate friend as she was of the founders of the Society, it was not too much to say that the prosperity and welfare of the Polytechnic was one of the interests of her busy and intellectual life. She was for many years one of the judges at the Exhibition, and a valued member of the General Committee.

August 30. J. R. Daniell, F.G.S., Camborne.

Sept. 24. The Rt. Hon. the Earl of St. Germans, who was elected a vice-president in 1884, and throughout his life took an interest in the proceedings of your Society, and gave it generous support on many special occasions.

Oct. 10. Rev. G. E. Hermon, Doublebois, who was a clever amateur photographer, and frequently sent photographs to your Exhibitions.

Nov. 10. Tom Moore, Redruth.

Nov. 24. T. L. Dorrington, Truro, of which place he was a worthy citizen and a liberal benefactor.

Nov. 24. Rev. W. R. Daine, M.A., a much appreciated member, whose tragic and untimely end is everywhere deplored.

Dec. 10. Sir Joseph Dalton Hooker, O.M., F.R.S., an Honorary Member, who lived to the age of 94. He was the most distinguished British botanist of his day, and his invaluable work in bringing Kew Gardens—of which he was for many years Director—into great scientific eminence is universally acknowledged.

Your Council desire to place on record their great pleasure that one of your most esteemed members, the Rev. Philip Carlyon, M.A., a former vice-president, has been graciously spared to celebrate his one-hundredth birthday on December 30, 1911, and they trust that he will continue to enjoy his present good health.

It will be your duty to elect four vice-presidents in the place of Messrs. Richard Pearce, Ph.D., F.G.S., H. D. Acland, F.G.S., R. Barclay Fox, and R. Arthur Thomas, who retire by rotation. The following gentlemen are recommended for election:—Hon. T. C. R. Agar Robartes, M.P., C. S. Goldman, M.P., Henry Jenner, F.S.A., and Captain Arthur Rogers, R.N.R.

The following names are recommended for election on the Council:—Miss. L. Paull, Mr. Henry Jenner, F.S.A., Col. Courtenay B. Vyvyan, and Lieut.-Col. the Hon. H. W. F. Trefusis.

The Council recommend the election of Sir Joseph Larmor, M.A., D.Sc., F.R.S., M.P., secretary of the Royal Society, as an Honorary Member.

Mr. E. J. Moseley has been appointed assistant secretary in the place of Mr. S. Roberts, who resigned on March 25, 1911, and the Council also recommended that Mr. Moseley be elected to fill the position of hon. secretary to the Art Union of Cornwall, rendered vacant by the death of Mr. W. A. Rollason.

Although the expenditure has been necessarily increased, the accounts, which are presented for your acceptance, show a satisfactory condition.

Librarian's Report for 1911.

THE year just ended has been essentially one of consolidation and steady progress in the Library, notably in the direction of filling up gaps in series and in subjects, and of carrying out a more scientific classification and arrangement of the books.

Several valuable donations of books have been received during the year, which are set forth at length in the List of Presents to the Library. Mr. F. J. Stephens has lent his valuable sets of the Geological Society's Quarterly Journal, the publications of the Geologists' Association, the Institute of Mining Engineers, and the Institution of Mining and Metallurgy. Mr. J. H. Collins presents a 'List of the Minerals found in Devon and Cornwall,' and Dr. J. Hambly Rowe, of Bradford, has sent an interesting set of his philosophical and scientific pamphlets.

The donation of books promised by the Cambridge University Press, in response to the application of the assistant librarian, has been received, and constitutes a very fine addition to the Library, including as it does a representative selection from the University's publications in philosophical, scientific and historical literature.

The British Museum has presented the concluding folios of a finely-illustrated work on historic medals, and the British Museum of Natural History has given valuable works on botany, zoology, and geology.

From the Mining and Geological Institute of India we have received its Journal and Proceedings, thus opening up a fresh corner of the world to those of our members who are interested in mining and geology.

In response to a special application, the United States Geological Survey has presented 168 folios of geological maps,

forming a matchless topographical and geological atlas of the United States, each part being accompanied by a detailed description of the district treated, with elucidatory sections and plans.

The publications of the American Historical Association are proving of special interest, comprising reprints of many manuscripts relating to the early history and colonization of North America.

The last Annual Report of this Society contained, as an appendix, a brief catalogue of the principal works and series in the Library. In pursuance of the system of arrangement adopted—the Dewey Decimal Classification—the sets of books have now all been assigned their proper class numbers, and detailed individual numbering is now proceeding. The donations received during the last three years have necessitated the provision of more shelving, on which have been accommodated the large collection of quartos and folios. Several sets have been bound, and thus preserved from deterioration.

To conclude: the Library is assuming the character of a methodically-arranged collection; but as our desire is still that of progress we confidently look forward to the accession of further valuable material from sources yet untouched.

F. HAMILTON DAVEY.

List of Donations to the Library.

GOVERNMENT AND OFFICIAL:—

Australian Museum: Records, vol. viii, nos. 1 and 2; vol. ix, nos. 1 and 2; Report for 1910.

Board of Agriculture: London: Journal for 1911.

British Museum: Medallie Illustrations of the History of Great Britain and Ireland, parts 14-17 and index.

British Museum of Natural History:

Marine Reptiles of the Oxford Clay, vol. i.

Guide to Mushrooms.

Handbook of Tsetse Flies.

Catalogue of Moths, vol. x.

Flora of Jamaica, vol. i.

British Lichens.

Canadian Geological Survey: Summary Report for 1910.

Report on N. W. Territories.

„ Geology of Lake Timiskaming.

Memoir, no. 1. Nipigon Basin.

„ 4. National Transcontinental Railway.

„ 5. Lewes and Nordenskiöld rivers, Yukon.

„ 8. Edmonton Coal-field.

„ 9. Bighorn Coal Basin.

„ 10. Extinct Lakes, Algonquin and Nipissing.

„ 11. Triangulation and Spirit-levelling.

„ 14. Shells from Vancouver Island.

„ 15. Trenton Echinoderm Fauna.

„ 16. Clay and Shales of Nova Scotia.

Mines branch: Mineral production of Canada, 1910.

Magnetic Concentration.

Peat Industry of Canada.

Chrysolite-asbestos.

Canadian Meteorological Service: Report for 1907.

Greenwich: Meteorological and Magnetic Observations, 1909.

Hong Kong: Observations at Hong Kong Observatory, 1910.

Meteorological Council: Hourly Readings, &c., 1910.

Monthly Meteorological Charts, 1911.

Meteorological Observations at Second Order Stations, 1907.

Mexico: Central Observatory Monthly Bulletins.

Western Australia: Geological Survey Bulletins, nos. 38, 39 & 41.

SOCIETIES, &c.—

Ashmolean Natural History Society of Oxfordshire: Proceedings and Report for 1910.

Bristol Naturalists' Society: Proceedings, 4th series, vol. ii, part 3; vol iii, part 1.

British Association: Report for 1910.

Cambridge University Press:—

Ancient Philosophy, by J. S. Mayor.

Natural Philosophy, by Kelvin and Tait, 2 vols.

Palæontology, by H. Woods.

Vertebrate Palæontology, by A. S. Woodward.

Mendel's 'Principles of Heredity,' by W. Bateson.

Darwin and Modern Science, by A. C. Seward.

Foundations of the 'Origin of species,' by C. Darwin.

Flowering Plants and Ferns, by J. C. Willis.

Trees, by H. M. Ward, 5 vols.

Physiology of Plants, by Darwin and Acton.

Zoology, by Shipley and MacBride.

British Freshwater Algæ, by G. S. West.

Geographical History of Mammals, by R. Lydekker.

Literature of Victorian Era, by H. Walker.

Poetical Works of John Milton.

Arnold of Rugby, by J. J. Findlay.

Origin of the English Nation, by H. M. Chadwick.

Expansion of British Empire, by Woodward.

French Monarchy, by A. J. Grant, 2 vols.

Colonization of Africa, by H. H. Johnston.

History of Scandinavia, by R. N. Bain.

Carnegie Institution of Washington: Department of Terrestrial Magnetism.

Reports for 1908-10.

Magnetic Table and Chart for 1905.

Earth's Magnetism, by L. A. Bauer.

Pamphlets on the Yacht 'Carnegie,' and her [magnetic] work, and on general investigations into Terrestrial Magnetism.

Life of Robert Were Fox, 1789-1877.

Chemical Society: Proceedings, completion of vol. xxvi and part of vol. xxvii.

Edinburgh Geological Society: Transactions, vol. vii, parts 1 and 3.

Institution of Mechanical Engineers: Subject-index of papers read, 1847-1910; Proceedings, 1910; List of Members, 1911.

Institution of Mining and Metallurgy: Bulletins, nos. 75, 76, 77, 78, 80.

Junior Institution of Engineers: Journal and Transactions, vol. xx.

Literary and Philosophical Society of Liverpool: Proceedings, 1907-10.

London and West Country Chamber of Mines: Records, vol. iii, parts 8, 9 and 10.

Manchester Literary and Philosophical Society: Memoirs and Proceedings, vol. lv, parts 1, 2 and 3.

Mining and Geological Institute of India: Transactions, vol. vi, parts 1, 2 and 3.

North of England Institute of Mining and Mechanical Engineers: Transactions, vol. lvii, part 8; vol. lxi, parts 1, 2 and 3. Index, 1902 (presented by F. J. Stephens).

Photographic Journal : Vol. li (1911).

Plymouth Institution : Annual Report for 1909-10.

Royal Dublin Society : Scientific Proceedings, vol. xiii, nos. 1-11.

Economic Proceedings, vol. ii, nos. 3 and 4.

Royal Geological Society of Cornwall : 97th Annual Report.

Royal Institution of Cornwall : Journal, vol. xviii, part 2.

Royal Institution of Great Britain : Proceedings, vol. xix, parts 1 and 2.

Royal Irish Academy : Proceedings, vol. xxviii, title-pages; vol. xxix, Section A, nos. 1, 3, 4; Section B, nos. 1, 2, 3, 4; Section C, nos. 1, 2, 3, 5, 6, 8; vol. xxxi, nos. 4, 5, 10, 22, 24, 35, 36, 37, 38, 52 and 65.

Royal Meteorological Committee : Report for 1910-11.

Royal Philosophical Society of Glasgow : Proceedings, vol. xli.

Royal Society : Year-book for 1911. Proceedings: series A, vol. lxxxiv, nos. 573-4, vol. lxxxv, nos. 575-583; series B, vol. lxxxiii, nos. 563-7, vol. lxxxiv, nos. 568-573.

Royal Society of Arts : Journal for 1911.

Southport Society of Natural Science : 13th and 14th Reports.

South Wales Institute of Engineers : Proceedings, vol. xxvii, nos. 3, 4, 5, 6.

UNITED STATES OF AMERICA :—

American Geographical Society : Bulletin, vol. xlii, nos. 1-12, 1911.

American Historical Association : Annual Report for 1908, vols. ii and iii.

American Philosophical Society : Proceedings, nos. 197-201; Transactions, vol. xxii, part i.

Chicago Field Museum of Natural History : Ornithological series, vol. i, no. 6; Zoological series, vol. vii, nos. 11, 12; vol. x, no. 4; Geological series, vol. xxi, no. 8.

Chicago Academy of Science: Bulletins, nos. 4, 5, 6, 7.

Lymnæidæ of North America.

New York Academy of Sciences: Annals, vol. xx, parts 1, 2, 3 and index; vol. xxi, parts 1 and 2.

New York Observatory: Meteorological observations for 1911.

New York State Education Dept.: Supplement to 6th Annual Report.

New York State Museum: Reports, nos. 51 (part 1), 58 (part 3), and 62 (part 2).

Smithsonian Institution: Annual Report for 1909.

Contributions to Knowledge, vol. xxvii, no. 3.

(Langley memoir on mechanical flight).

Miscellaneous Collections, vol. liii, part 1; vol. lvi, nos. 12, 14-22; vol. lvii, nos. 1-5; vol. lviii, no. 1.

U.S. Geological Survey:

31st Annual Report.

Bulletins, nos. 381, 429-431, 433-447, 449-465, 468, 469, 472, 473, 475-477, 479, 480-482.

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PRIVATE DONORS:

Bauer, L. A.—Life and Work of Robert Were Fox, 1789-1877.

Collins, J. H.—List of Minerals found in Devon and Cornwall.

Rowe, Dr. J. H.—Collection of Pamphlets written or edited by.

Stephens, F. J.—Sets of Publications placed in the Society's

Library for reference.

Geologists' Association: Proceedings, vol. xii, part 3; vol. xiv, parts 9, 10; vol. xv, parts 2-5, 10 and index; vol. xvi, parts 1, 4, 6; List of Members, 1894.

Geological Society (London): Quarterly Journal, 1875-1911.

Institution of Mining and Metallurgy: Transactions, vols. ix, xii-xviii, xx.

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Engineering Magazine—Reprints of Articles on Metallurgy and Mining.

Hon. Treasurer in Account with the Royal Cornwall Polytechnic Society.

RENOVATION FUND.

Dr.

1911.

Cr.

	£	s.	d.		£	s.	d.
To Balance in Capital and Counties Bank	228	3	5	By S. Hill—Architect's Fees	..	6	6
„ Subscription	1	1	0	„ Falmouth Waterworks Co.	..	2	15
				„ Williams & Co.—Water Pipes	..	14	10
				„ Blight & Son—Carpentry	£45 0 0		
				„ „	33 4 6		
					78 4 6		
				„ T. Solomon & Co —Restoring Picture Frames	..	17	3
				„ W. A. Rollason—Restoring Pictures	46 5 0		
				Balance in Capital and Counties Bank, Falmouth	..	64	0
					..	64	0
					£229 4 5		

Examined and found correct, January 18th, 1912.

H. D. ACLAND.

HAROLD B. CARLYON,

Hon Treasurer in Account with the Royal Cornwall Polytechnic Society.

DR.

1911

CR.

	£	s.	d.
To Donation H.R.H. Prince of Wales	5	0	0
„ Members' Subscriptions	£162	17	6
„ Arrears	3	0	6
	165	18	0
„ Rent of Hall, Gas, and Care-taker's Fees	336	6	0
„ Rent, Falmouth Subscription Library	10	0	0
„ Rent, Acknowledgment Spanish Telegraph Co.	1	0	0
	10	1	0
„ Receipts Summer Meeting—			
Excursion Tickets	5	5	0
Admission, Polytechnic Hall	2	0	0
Catalogues sold	3	6	
	7	8	6
„ Grant from Cornwall County Council, 1910	30	0	0
„ Grant from Cornwall County Council—Summer Meeting, 1911	10	0	0
	40	0	0
„ Exhibitors Charges	15	6	0
„ Sale of Reports	1	9	2
„ Interest on Deposit Accounts	9	9	5
	£590	18	1

	£	s.	d.
By Due to Treasurer	19	17	4
„ Outstanding Cheques	2	4	5
„ Salaries	85	10	0
„ Hallkeeper	31	0	0
„ „ Fees	38	3	0
„ Gas, Electric Light, and Coal	45	10	2
„ Rates and Taxes	31	6	7
„ Insurances	5	7	6
„ Travelling Expenses	9	0	8
„ Winding Clock—F. Morris	1	0	0
„ Repairs and Renewals	20	17	4
„ Postages and Telegrams	12	0	11
„ Printing and Stationery	37	8	4
„ Cheque Books	1	5	0
„ Summer Meeting—			
„ Conveyances	£4	11	0
„ Refreshments	7	4	4
„ Advertising	11	16	0
„ Billposting	3	12	3
„ Labour	9	12	6
„ Secretary's Expenses	3	5	9
„ Reporting Lecture	1	1	0
	41	2	10
„ Annual Report	47	7	1
„ Materials	9	16	3
„ Medals	2	19	4
„ Diplomas—Waterlow & Son	6	14	6
„ Railway Carriages	2	2	10
„ Rents	21	13	0
„ Licenses for Hall	2	2	6
„ Report on Medal Dies—Spink	1	1	0
„ Bookbinding	7	0	1
„ Preparation of Agreement	5	0	
„ Balance in Capital and Counties Bank	103	5	5
„ Balance in Secretary's hands	4	17	0
	108	2	5
	£590	18	1

	£	s.	d.
ASSETS—Balance in Capital and Counties Bank, Ltd., on Current Account	£103	5	5
„ In Secretary's hands	4	17	0
	108	2	5
Miss Fox's Legacy, on Deposit Account	50	0	0
No. 2 Deposit Account	350	0	0
Arrears of Subscriptions	31	16	0
	£489	18	5

LIABILITIES—Nil

NOTE.—The Society also possesses the Freehold of the Polytechnic Hall.

Examined and found correct, HAROLD B. CARLYON,
H. D. ACLAND.

Summer Meeting, 1911.

B RILLIANT weather and an attractive programme drew to the several events of the Summer Meeting of the Royal Cornwall Polytechnic Society for 1911 large gatherings of members and their friends. The Meeting opened on Tuesday, July 11, with an exhibition in the Polytechnic Hall, Falmouth, of the work of students attending the art and technical classes under the County Council, supplemented by an extensive collection of water-colour studies executed by Miss L. Violet Hodgkin, daughter of the president, during a recent trip to the Antipodes, and a number of beautiful paintings of plants, birds, and other objects by Mrs. Hodgkin. In the evening the president and Mrs. Hodgkin held a reception, and subsequently Dr. Hodgkin addressed the large assembly on Australia and New Zealand. On Wednesday, July 12, there was a well-attended excursion to Perran Round and St. Piran's Oratory, where papers were read by Mr. H. Jenner, and to Wheal Kitty Mine, where the visitors were under the able guidance of Mr. J. H. Collins. Thursday, July 13, was a busy day at the Polytechnic Hall, Mr. Sigmund Stein and Mr. W. J. Hosken being responsible for a series of demonstrations illustrating the whole process of beet sugar manufacture.

THE ART EXHIBITS.

The drawings were judged by Mr. H. S. Tuke, A R.A., and Mr. Julius Olsson, who found some excellent examples in the class for articles designed for any technical purpose. The designs were very effective, and two silver medals were awarded in addition to the bronze medals. The repoussé work and wood carving were fair, but not of such merit as to justify the award of a silver

medal, and two bronze medals were awarded, one in each section. The embroidery and stencil work secured three bronze medals. In the modelling section there was only one exhibit which merited a bronze medal. The judges considered the exhibits of a head, or figure, or animals from still life, of indifferent quality, and the weakest class in the exhibition. Still life or flowers in oils or water colours made a strong class, and three silver and two bronze medals were presented. Special mention was made of the still life exhibit of Miss Gladys Goldsworthy, of Redruth. The judges gave two bronze medals for head or figure from life, but presented no medal for head or specimen from the antique. Some excellent work was shown of ornaments in light and shade, and one silver and three bronze medals were secured. Special attention was drawn to the work of Miss Violet Dorothy Collins, Penzance. There were very few entries of models and common objects in light and shade, but the work was very encouraging, and a bronze medal was awarded. The specimens of plants from nature did not call for special comment. There were very few mechanical drawings, but one was given a silver medal. One of the sights of the exhibition to be seen upstairs was a collection of water-colour studies in Australia and New Zealand by Miss L. Violet Hodgkin, daughter of the president. The judges' awards were as follows :

SILVER MEDALS:—Edward J. Chegwidden, Truro, for designs for showcards; Jane Reed, Truro, for design; V. D. Collins, Penzance, for ornament in light and shade; Gladys Goldsworthy, Redruth, Mabel Deacon, Liskeard, and Mary Venning, Liskeard, for still life; H. H. Tresidder, Falmouth, for life study.

BRONZE MEDALS:—G. M. Mitchell, Penzance, for drawing from antique; F. M. Eustice, Camborne, for repoussé; Rose Vicary, Camborne, for embroidered panel; Eva Wright, Camborne, for stencilled cushion cover; Adelaide Jago, Camborne, and N. H. Penprase, Redruth, for light and shade; E. A. L. Martyn, Redruth, design; K. Hammond, Liskeard, for carved frame;

Vera Dunk, Liskeard, for cushion cover; Mabel Deacon, Liskeard, for still life; Amy Stanton, Liskeard, for head from life; Violet E. W. Nation, Falmouth, for head from life, and water colour.

DIPLOMAS OF MERIT:—Carrie Glasson, Helston, for stencilled design; Percy H. Gill, Helston, for still life; Carrie Glasson, Helston, for still life, fruit shaded from east; Sylvia Haydon, Helston, for still life; Barbara Napier Hemy, Truro, for design for panel; M. Polkinhorn, Truro, for design; Benjamin McLean, Truro, for Japanese landscapes, and for birds in colour; Hilda F. Bryant, Truro, for still life; Lydia M. Panting, Truro, for still life; Elizabeth M. Trenerry, Truro, for still life; Elsie Elliott, Truro, for study from antique; Chas. S. Dunstan, Truro, for study of pheasant; Ida D. Bennett, Camborne, for head from east; Adelaide Jago, Camborne, for design; R. J. Paul, Camborne, for carved panel; N. H. Penprase, Redruth, for marble carving and for modelling; Gladys I. Jarvis, Redruth, for still life; James C. Middleton, Redruth, for light and shade; Gladys Goldsworthy, Redruth, and Percy Eley, Redruth, for head from antique; N. H. Penprase, Redruth, for perspective; E. A. L. Martyn, Redruth, for design; Dorothy Caddy, Liskeard, and Jessica Dowling, Liskeard, for head from life; Dorothy C. Downing, Falmouth, for still life; H. H. Tresidder, Falmouth, for head from east; Amy E. B. Hicks, Falmouth, for plants from nature; Mary H. Holderness, Falmouth, for plant form; Eleanor G. Geach, Penzance, and Mary J. Allfrey, Penzance, for design; Alice M. M. Knight, Penzance, for repoussé; Gwendoline M. Michell, Penzance, and Thomas H. Victor, Penzance, for drawing from the antique; Gwendoline M. Michell, Penzance, and Marie H. Michell, Penzance, for light and shade.

DR. HODGKIN'S LECTURE.

For the conversazione on Tuesday evening the Polytechnic Hall was decorated with admirable taste by Messrs. Julian & Co., Strongman, and R. E. Gill. Choice specimens of rare palms and a variety of flags graced the balcony and the front of the platform, whilst the body of the Hall was tastefully arranged as a drawing room.

Mr. J. D. Enys presided over the gathering, and said he introduced the president with a great deal of pleasure, as he was going to talk to them about a part of the world in which he (Mr. Enys) had spent thirty years of his life.

The president, in the course of his lecture, said English people naturally were apt to think of the two countries almost as one, and ask why should not New Zealand and Australia form one great commonwealth? One thing which impressed the traveller was how far separated they were from one another. They were two different countries perfectly friendly. In New Zealand one seldom heard about Australia, and in Australia one seldom heard about New Zealand. They were separated by more than 1,000 miles of ill-tempered water. Continuing, the president spoke of Auckland, which sat in the midst of a multitude of volcanoes, and he supposed anyone of them might open out again. Auckland used to be the official capital of New Zealand, and almost all the chief transactions between their Government and New Zealand had reference to the northern part of the island. The capital was now removed practically to Wellington, because it was near the south of the north island. It was very central, but it had one great disadvantage, because the hills rose rapidly behind it, and that made land very scarce and costly. Wellington was now a beautiful city, but it suffered from scarcity of ground. There was now a University at Wellington, and when there the lecturer made it his business, after having had an introduction, to visit the principal of the University. The principal told him

that after they had got their plans out for the college, 'Jack' Seddon, as he was commonly called (he alluded to the late Prime Minister), said they must have more show, and he gave them £1,300 more, and told them they must add another storey to the building. At the time they added the top storey it was hardly necessary, but colleges and universities were always growing, and he thought they would find they had great use for the addition furnished by Mr. Seddon. There was one great distinction between the North and South Islands, namely, that in the South Islands they had mountains and beautiful lakes, and by contrast they were called the cold lakes, for in the North Islands the lakes were hot. The northern lakes were hissing hot and sent up streams of vapour, some of which could be seen in his daughter's sketches. It was essentially a volcanic region. When they were there they were disturbed by a roar and a rumble, and they found they were in for an earthquake, though not a severe one, and they had the glory of living through it. In those hot springs to which he had previously referred they could see little boys bathing practically at any time. They seemed to spend nearly the whole day sitting in the hot springs and enjoying themselves. No doubt they had all heard of the beautiful pink and white terraces which were to be seen in these volcanic regions which were disturbed by an outburst of a volcano. The whole side of a mountain was blown out by the force of the explosion, and suddenly it turned into high pressure steam, and mud and ashes and so on was thrown up over the whole district and many lives were lost owing to roofs falling in. There was also thick darkness over the land until the next day. No doubt all the Maoris and some of the Europeans thought the end of the world had come.

The one great interest of New Zealand was the existence of the Maori people there. There was no half-civilised race which civilised man had come in contact with who had shown anything like the same intellectual capacity as the Maoris. Their carvings were beautiful, and the most beautiful of them were done without

the possession of iron or steel instruments. The Maoris were not extremely fond of work, and they did not love work for its own sake, but they were an honest people, and a people with very fine qualities. They were also large landowners, and on the whole, the Government had behaved very fairly to them. They usually embraced Christianity, many of them possessing a very good knowledge of it.

Turning to Australia, the lecturer said it was a continent of great potentialities. With a continent of nearly three million square miles it was impossible, humanly speaking, for four millions of people, unless they grew vastly, to keep that country for many centuries. At present the cry was all for a white Australia. They had driven out the Malays, the Chinese, and the Japanese. He had come away from there impressed with the absolute importance and necessity of Australia getting a great number of immigrants, he should say from England and Scotland, and he would welcome immigrants from Scandinavia as well as from Holland and Germany. He visited the descendants of German colonists who went out sixty or seventy years ago, and they were admirable settlers. He believed if Kaiser Wilhelm would allow his subjects to settle under the British flag it would have an admirable effect, politically, socially, and economically. He did not want to see the Latin races take a great part in the emigration. There were various reasons why he should like to see the emigration Teutonic and Scandinavian.

Speaking of the droughts of Australia, the lecturer said about ten or twelve years ago there was a most terrific drought, affecting chiefly New South Wales, and perhaps touching a little of South Australia and Victoria. Sheep died by hundreds of thousands, and men who had gone out after great labour and difficulty and made their pile, saw everything scattered and withered before them. They were told that a drought of that kind, which lasted about eighteen months, was phenomenal. But it was not a thing likely to occur more than once or twice in a cen-

tury. He believed South Australia would eventually be one of the great corn producing regions of the world.—(Applause). Probably England would draw increasingly on her corn supplies from her daughter, South Australia. West Australia was one of the chief gold producing regions of Australia. It produced three-quarters, at least, of the whole gold production of Australia. He could not quite remember the number of tons, but Western Australia took its place very high indeed among the gold producing regions of the world. In order to make that fact possible an Australian statesmen devised a splendid scheme of water supply. From a lake water was pumped up about 300 miles to Coolgardie, in order to feed the goldfields. He (Dr. Hodgkin) thought it was the finest hydraulic feat that had been achieved. It had made life in the goldfields possible.

Continuing, Dr. Hodgkin said that Perth was a most beautifully situated place, and he thought that in years to come it would be one of the great beauty spots of the world. He was glad to see Western Australians were more liberal in welcoming immigrants than most other states. Western Australia knew she needed men badly, and immigrants going out there were met in the harbour by Government officers (certainly not policemen) who took charge of them by taking them to a home, which reminded them of the Sailors' Home, Falmouth, and there they were welcomed. They were well looked after, and cared for for a week without cost. They soon found work, and the State was very liberal in the terms on which they allowed them land. Naturally, being a banker, the lecturer must have a talk with a banker, and the manager of the State Bank told him that in all the years of the bank's existence they had only made about a £7 bad debt.—(Applause). As a banker, that made his mouth water. The arrangements made by Western Australia for the welcome of immigrants had been extremely successful, and their liberality had been rewarded. The supply of emigrants to Australia used to be absolutely useless, but, he was glad to say, it was rising now. The natural increase of population was distressingly slow. The

president concluded with a reference to Sydney Harbour and Queensland, and said it seemed that, notwithstanding the great heat, European life was as long in Queensland as it was anywhere else. It did not seem to be so fatal to the European race as one might suppose. In winter time it seemed to be perfect, and he should like a Queensland winter and an English summer.

The chairman moved a hearty vote of thanks to the president for his splendid address, which he had listened to with extreme pleasure. He (the chairman) helped to erect the first telegraph poles in New Zealand in 1864, and he thought he could look upon himself as being one of the oldest inhabitants, because Christchurch was in its tenth year when he landed there.

The Mayor (Alderman F. J. Bowles) seconded, and said he remembered hearing a long time ago that three of the chief requisites for a tour such as their president had been on were health, money and leisure. But he ventured to think that there was a fourth, and that was capacity for intelligent observation, and that their president possessed. They felt especially indebted to him, and also to Miss Hodgkin for the important part she had played in the matter.

The resolution was heartily carried, the president suitably responding.

THE EXCURSION.

On Wednesday a party of about fifty had an excursion to Perran Round, St. Piran's Oratory, and Wheal Kitty Mine, St. Agnes. The weather was ideal, and the trip was thoroughly enjoyed. The company included Dr. Hodgkin (president), Mr. and Mrs. W. W. J. Sharpe, Mr. and Mrs. Howard Fox, Mr. H. Orme Fox, Mr. A. P. Jenkin, Miss Mills, Mr. and Mrs. R. Barclay Fox, Mr. and Mrs. E. W. Newton, Lieut. Mervyn Stewart, Major Luard, Mr. and Mrs. Wilson L. Fox, Mr. J. H. Collins, Miss Collins, Mrs. Hatch, Miss Merryweather, Mr. G. Newton, Mr. and Mrs. H. Jenner, Mr. and Mrs. G. H. Fox, Mr. F. Hamilton Davey,

Mr. Willmore, Rev. R. F. Moody, Mrs. Chellew-Woolcock, Miss Annette Fox, Miss Erica Fox, Dr. and Mrs. Green, Rev. T. S. Tolson, Mr. Bickle, Mr. E. C. Murdock, Dr. Whitworth and Mr. E. J. Moseley. On arriving at Goonhavern the party were taken by three conveyances to Perran Round, where a paper dealing with the history of the place was read by Mr. Jenner.

After another short drive and walk St. Piran's Oratory was reached, and this ancient building and St. Piran's house and well were inspected. Considerable surprise was expressed at the style of the concrete building that has been constructed around the ruins of the Oratory for protection and preservation. Mr. Jenner having read an exhaustive paper on 'Christian worship at St. Piran's Oratory in the sixth and seventh centuries,' the president said Mr. Jenner had evidently taken a great deal of pains and given a great deal of labour for their instruction. He moved a vote of thanks to him for his paper.

Mr. J. H. Collins, seconding, said his feeling was one of deepest regret at seeing the small remains of that most ancient church buried in that ugly edifice. He thought such preservation was worse than no preservation at all. He did not agree that it was necessary. A ruin which had stood there for 1,200 or 1,300 years might have been preserved for 1,200 or 1,300 years more without putting such an eyesore around it, but there it was, and they must make the best of it. He did not want to cast any censure upon those who had done their best to preserve the building, but he must give expression to his feelings in the matter in the way he had done. He noticed a cross on what looked like a water tank. If it was not part of the church it should not be there, and if it was part of the church he objected strongly to its being kept there. Mr. Collins concluded by characterising the building as a wretched structure of cement.

The president considered Mr. Jenner one of the greatest authorities on the real Cornish language, and hoped that before long Mr. Jenner would give them a map of Cornwall, showing the

meaning of all Cornish names, as interest in the county would be so much increased if they knew the meaning of names.

The vote of thanks having been carried, Mr. Jenner said the proposed map was rather a large order. He hoped, however, that something was being done to bring about a systematic survey of all Cornish place names. He had got several people interested in the scheme to map out the county in several districts and collect the material. In this direction he hoped the Polytechnic Society would help, as well as the Royal Institution of Cornwall.

The party next drove to Perranporth, where luncheon was partaken of on the sands. After about an hour's stay a start was made for Wheal Kitty Mine, where, by the courtesy of Mr. J. H. Collins, F.G.S., chairman of the company, the mine was inspected. Mr. Collins conducted the visitors around, and taking them to a point of vantage said that before them was one of the most picturesque square miles of country in Cornwall. There was situate Wheal Kitty, West Kitty, the famous old mine of Polberro, Penhalls, &c. In that small area, since 1850, when Mr. Hunt began his mineral statistics, a great deal more than one and a half million sterling of tin had been raised. According to the tradition of the country a great deal more was raised before that. How much was going to be raised in the future he could not say, but that square mile had turned out a very large quantity of tin every year, and seemed likely to continue to do so. On Wheal Kitty they were sinking a very fine shaft, one of the best in Cornwall, and putting up some of the finest machinery, and it would be *the* shaft and *the* machinery of the mine in the future. Mr. Collins explained in detail the working of the mine, and the guests were afterwards entertained to tea at the account house.

SUGAR BEET CULTURE IN CORNWALL.

Always eager to accept an opportunity to further anything that tends to benefit the county, whether scientifically or industrially, the Polytechnic Society extended an invitation to Mr. Sigmund Stein to give a demonstration and lecture, on behalf of the English Beet Sugar Pioneers' Association, on the closing day of the 1911 Summer Meeting. This was accepted, and the stand which dealt with the industry occupied quite one-half of the Polytechnic Hall. Here the visitor saw the beet growing and the sugar after its several treatments. There was a sample of diffusion juice, first and second saturation juice, thick juice, clear sugar liquor, granulated sugar, castor sugar, yellow sugar, cube sugar, and confectionery sugar. One of the principal by-products of the sugar beet was displayed, viz., saturation lime, which has most valuable manurial properties, while there was also a sample of beet pulp, which is used as a cattle food on the Continent. An interesting feature of the exhibition was that all the roots were grown on Mr. W. J. Hosken's farm at Pulsack, Hayle, and the soundness of the beet grown in 1910 demonstrated another advantage which Cornwall possesses. On the Continent the period of treatment of the beet for sugar is limited, owing to the roots being affected by frost; but in Cornwall the crop could, it was stated, be carried on for quite two months longer. After the demonstrations a lecture on the sugar beet industry was delivered by Mr. Stein.

The president of the Society, who presided, remarked that although they had not a large audience, they had a representative one, and one containing a considerable number of those they desired to see interested in the question of sugar beet cultivation in Cornwall. All sensible Englishmen would welcome with delight the establishment of a new industry in their country, an industry which would be able to stand alone, unsupported. Whatever enabled them to get a little more out of the planet, or

to increase employment to some of the forty million persons settled in the British Isles would be a blessing, and they would hail the new industry with delight if it could be proved that it was economically possible to grow beet. He would ask Mr. Stein to clear away from his (the president's) mind the impression, which had been lodged there by the course of discussion and the history of the cultivation, that the beet root industry required to be supported by bounties in order to make it a success. He believed Mr. Stein would show that beet root cultivation was not a sickly artificial sort of thing, which needed to be propped up by bounties.

Mr. Sigmund Stein observed that the question was a very important one indeed, and great credit was due to the Polytechnic Society for taking it up, and thereby giving an opportunity for a matter of great importance from a national, commercial, and social point of view to be discussed. They had to put their heads together so as to give employment to 600,000 people, and to give to agriculturists a new crop, a profitable crop, which Germans had cultivated for the last hundred years. It was 76 years ago that sugar beet growing in the United Kingdom was started, and they had experimented all that time for the purpose of doing nothing. The Germans had got enormously rich; the English did not get rich—they were the slowest people in the universe. He came to Cornwall wanting Cornishmen to show England what she could do, and to lead the way in starting the first sugar beet factory in the United Kingdom. He would try to answer the question of the chairman, viz., whether beet growing was profitable, and whether it required to be supported by bounties. If, said Mr. Stein, the sugar beet industry needed to be treated as a hot house plant and supported by artificial means, it would be better to leave it alone. Great Britain was the greatest sugar consumer in the world; the people consumed 90lbs. of sugar per head per annum, and imported nearly 1,980,000 tons annually. Although England was a very rich country she could not afford to send abroad 25 million sterling to encourage foreign

industries, foreign agriculturists, foreign labourers, foreign engineers—and he might go on saying foreign for half an hour.—(Laughter). John Bull did a foolish but wonderful trick. Sugar beet was grown in the eastern counties, and sent over to Holland, for Holland to send it back again; the Dutch must think the English very foolish indeed not to know how to make sugar out of sugar beet. In England they grew the beet for the Dutch, but why could they not grow it for themselves? Further, as the eastern counties grew sugar beet so Cornwall could do so, and much better. In Cornwall, Dorset and Devonshire there was little frost; the sharp frosts that occurred on the Continent, which were not known in Cornwall, killed beet.

Dealing with the question of bounties, Mr. Stein said bounties on the Continent were dead and buried; they were settled and executed by the Brussels Convention, and unless England started them they would not be revived. Those bounties prevented them starting a sugar beet industry in the country before 1903, and now they were on the same footing as Continental farmers. There was a factory in Ireland sixty years ago, carried on by an expert soap maker, but little factories failed principally because they made enemies of the farmers, and if a factory made enemies with the farmers it would go to the Bankruptcy Court. If farmers did not grow the sugar beet the factories could not exist. Some persons said they could not grow beet because there was not sufficient sun, but it was ridiculous for those stupid people to write stupid letters to stupid newspapers to that effect. Many people in England were so patriotic that they rather wished to import sugar than to make it in their own country; they were so patriotic because they thought so much of their own pockets—they were interested in foreign sugar. Others said beet could not be profitably grown because labour was not sufficiently cheap; they said labour could be had on the Continent for one penny per hour. That time, said Mr. Stein, was gone, and the cost of labour was the same as it was in England. Referring to the cultivation of beet root, Mr. Stein remarked: 'Grow it as you grow the

mangold,' and in England there were the best mangold growers in the world. They had also proved, after many years, that they were the best beet growers in the world. They had produced roots containing 17, 18 and 19 per cent. of sugar, compared with 15 and 16 in Germany, and they had grown from as much as 27 tons to 17 and 18 tons to the acre, against twelve tons in Germany, which was also about the maximum for the Continent. A gentleman at Hayle last year grew 26 tons per acre, and after analysis the beet was found to be three per cent. richer than German beet.

Why did he want them to grow beet? It was because he wished them to make a profit by it. From the returns of 500 or 600 farms he had experimented on, it was shown that it took £9 to £10 to grow an acre of sugar beet, and they would naturally want to know how much they made from it. As he had told them, a gentleman at Hayle had 26 tons to the acre, but he would only take 18 tons. The factory in Cornwall would pay £1 per ton delivered at the factory. That meant £18 for the 18 tons grown on the acre, which left a gross profit of £8. He said gross, because they had to allow for the carriage of the beet from field to the factory, and if they allowed £3 per acre for this, there would be £5 net profit. This, however, was not all, for the factory offered more. Superior manure was offered practically for nothing—at a few shillings per ton, and in the pulp—and the residue of the beet, after the sugar had been extracted, gave a valuable cattle food. Only the sugar was taken out, leaving the beet root with its nourishing properties, and on the Continent the pulp was largely used as a cattle food. Further, the factory would be on the co-operative system, and whether they were shareholders or not in the factory they would participate in the proceeds, for after the shareholders had received a reasonable commercial profit, a part of the remaining profit would go to the contracting farmers in the way of bonus. There were other advantages of beet growing, the principal of which were that it improved the land, and the leaves of the beet root were a very valuable cattle

food. The factory they wanted to establish at Hayle would be a pretty large one, and would deal with 500 tons of sugar beet every twenty-four hours, working day and night, for 120 to 150 days, or 50,000 tons during the season. The factory would cost from £80,000 to £100,000, and many friends had promised to support the scheme. The natural question would be whether they would be able to compete with the old-established factories on the Continent. The principal thing was that they would be able to offer a good article, at least at the same price; a better article than the German, and at least at the same price. They would not want to send their sugar to Inverness or Glasgow, because a lot was required in Cornwall, and consumption in the county would save freight. It was much cheaper to make sugar to consume in Cornwall than to bring sugar from France or Germany. Further, they would be able to obtain modern machinery with improvements for labour saving, and would, therefore, be able to compete with all comers. Answering the question whether the industry was profitable, Mr. Stein said from the balance sheets it was shown that the average profit in German factories was $28\frac{1}{2}$ per cent., the lowest being about 10, and the highest about 50 or 60 per cent. Therefore, if it paid the German why should it not pay the Cornishman, who possessed all the advantages he had enumerated? The sugar bounties were abolished eight years ago, and the factories showed by their continuance and ability to pay large dividends that they could exist without any government support.

Mr. Howard Fox, proposing a vote of thanks to Mr. Stein, said their Continental friends had been experimenting for 100 years, and at the end of that time they in England could come in and reap the benefit of those experiments, and have the best possible machinery. He hoped the lecture would stimulate Cornish people to set an example to the rest of England.

Mr. R. Barclay Fox seconded, and the president, supporting, said he could not help thinking that in the south there was certainly sun enough to produce sugar beet. What a splendid

thing for Cornwall it would be if there were groups of farms devoted to the growth of beet root near the Helford and Truro rivers. He hoped something practical would be the result of the movement.

The vote of thanks having been carried, a similar compliment was paid Mr. W. J. Hosken, and to the chairman.

Mr. Hosken said he hoped and trusted the farmers of Cornwall—for it all depended on them—would rally around the pioneers, and so make it possible within a short time to lay the foundation stone of the first beet sugar factory in England.

Perran Round and the Cornish Drama.

BY HENRY JENNER, F.S.A.

*A Paper read at the Round during the Summer Excursion of
the Royal Cornwall Polytechnic Society, July 12, 1911.*

THE time allowed for this paper is necessarily very short, so that at best it can only be a slight sketch of the possible use to which this structure, if one may so call it, was put.

The great interest of Perran Round is that at one period of its existence it was used as an amphitheatre for the performance of those Cornish dramas, which are almost all that we have left to us of the literature of our country. The evidence for this is indirect, for there is no actual record of any such use. But there are several reasons for believing this to have been the case, the principal of which is that it is identical in shape and structure, and within four feet of the diameter, of the Round at St. Just-in-Penwith, where there is a definite tradition, shown in its name, 'the Amphitheatre,' or 'the Plain.' Moreover, there are still visible, though faint, indications of seats, which in Borlase's day were more apparent than now, as they were at St. Just. Those of the latter have quite disappeared now, though when that accurate writer described them there were six tiers of stone seats fourteen inches wide and a foot in height.

The description given by Richard Carew in the final decadence of the Cornish drama points to temporary structures of earth, of much smaller dimensions, being made for the occasions. He speaks of their being forty or fifty feet in diameter. This Round is a hundred and thirty feet, and that of St. Just a hundred and twenty-six. Scawen, writing about seventy or eighty years later, when nought remained of the Cornish drama but tradition and

books of the words, speaks of the plays being acted 'not without some show of devotion in open and spacious downs of great capacity, encompassed about with earthen banks, and in some part stone-work of largeness to contain thousands, the shapes of which remain in many places to this day, though the use of them long since gone.' This describes such places as Perran and St. Just Rounds rather than Carew's temporary structures. The name 'Plain-an-gwarry,' the Plain of the Play, is found at Redruth, Ruan Minor, Ruan Major, Sithney, St. Hilary, and Landewednack, but in none of these places is there any trace of a theatre to be seen. At Roseworthy Wood, in Gwinear parish, there is a Round which has some resemblance to one of these two existing 'plains.' My attention was recently called to it by our secretary, Mr. Newton, and I visited it the other day. It is about half way between Gwinear Road and Camborne stations, a little to the south of the railway. It is an oval some three hundred and ten feet in its longest diameter, and about two hundred and seventy feet in its shortest, and is surrounded by a rampart and a ditch. There is nothing to show that it was ever used as a theatre, but it is only about a mile or so from Camborne, and might perhaps have been the scene of a performance of the Camborne drama of St. Meriasek. But it is evident from its position, crowning a hill, and the higher level of its interior, that it was originally a fortress, and there are no indications of seats for any audience.

There are between eighty and ninety other recorded 'Rounds' with single entrenchments scattered about Cornwall. Most of these were certainly fortresses or camps in their origin, and in many cases are of irregular shape and would not have been suitable for amphitheatres. Whether Perran Round began life as a fort or camp or as a theatre is uncertain, but I am inclined to think that it was always a theatre. The exactly circular shape, the slope of the banks on the inner side, the two entrances, which seem to be original, exactly opposite each other, and the fact that the level of the enclosed plain is the same as that of the sur-

rounding country, whereas in a fort, for obvious strategical reasons, the interior is generally higher, all point to this conclusion.* The slight indications of seats, which were evidently more marked in Borlase's day than now, though they were probably never anything but turf seats, would not of themselves shew more than a possible adaptation of an already existing structure; but the resemblance in every detail except material to the unmistakable stone-built amphitheatre at St. Just is really the most convincing point.

From the stage directions in the Cornish Dramas, and from the sketch-plans of the final positions of the actors when they made their bows to the audience, given at the end of the 14th century 'Ordinalia' plays and in the early 16th century 'St. Meriasek' play, the Cornish theatre was circular, with a raised stage, also circular, in the centre. The raised stage is called 'Pulpitum' in the 'Ordinalia,' which is the regular Latin word for a scaffold, platform or stage. The lower space is called 'Platea' in the 'Ordinalia,' 'Placea' in the 'St. Meriasek,' and 'the Playne' in the 'Creation of the World' play of 1611. In the first and third of the 'Ordinalia' trilogy and in the 'St. Meriasek' two sites are marked on these diagrams, besides the position of the actors. One of these is 'Cœlum,' Heaven, and the other is 'Infernum,' Hell. In the second play only 'Cœlum' is noted, for 'Infernum' is not the scene of any part of that play. Both sites are in the 'Platea,' and in the 'Ordinalia' at right angles to one another. Probably 'Cœlum' was raised up, with imitation of clouds. In the 'Creation' play, where the directions are in English, there seem to have been folding leaves to it. 'The Father must be in a clowde and when he speakethe let y^e levys open.' In this

*It is only fair to say that a writer in the 'Cornwall County News' of July 19, 1911, controverts my opinion, stating that the entrances were made in comparatively modern times (of which I should like a little more evidence), comparing the Round with those at Cubert and Wheal Frances, not far off, and laying stress on the external foss, as evidence of an original fort. I think the foss is only the result of digging out earth to form the embankment, but the other arguments are important, and increase the uncertainty of the origin of the Round.

Round, and that at St. Just, it will be noticed that there is a pit or depression, not in the centre, but yet at some little distance from the circumference. In many of the Rounds, which were certainly hill-forts, one often finds similar pits for the storage of water, even if there is not an actual spring, as there often is. In this case, however, the object of this pit is not water—quite the contrary—for it was probably used to represent Hell. Probably it was covered with a canvas and wood-framed representation of that huge and hideous mouth, which is common in mediæval pictures of Our Lord's Descent into Hell and of the Day of Judgment. In the 'Creation' play there is a directions 'Lett hell gape when y^e Father nameth yt.' In this play and in the first of the 'Ordinalia,' the subject of which is the same, the Genesis history from the Creation to the Flood, there are frequent directions about ascending to Heaven and descending to Hell, as well as simple directions to ascend and descend, which probably meant, not what to 'go up' and 'go down' mean in a modern theatre, but to go up to the 'Pulpitum' or down to the 'Platea.' A great part of the action evidently takes place in the 'Playne.'

There seems to have been a fair amount of scenery. Paradise, for example, was represented as a garden 'fynelye made wyth ii fair trees in yt and an appell vpon the tree & som other frute one the other,' and there was to be a 'fowntaine in Paradice & fyne flowers in yt painted.' One finds also mountains, 'practical' ones, as the theatre people would say, for they have to be ascended, a river for Bathsheba to wash in, and another to represent the Tiber, into which the body of Pilate is to be cast. The Temple of Jerusalem was represented, and the houses of Caiaphas, Pilate and Herod, and the Praetorium. They are sometimes called 'tents,' which is what no doubt they were. Horses are brought on, and in the 'St. Meriasek' a wolf, a dragon, dogs and deer. The dragon, which was probably something like 'Snap,' the pageant dragon in Norwich Castle, or the 'Tarasque' of St. Martha at Tarascon, had a very simple device. The direction is 'here a gonn yn y^e dragon ys mouthe & fyr.' In

the scene of the naming of the animals by Adam, and for Noah's Ark, a considerable zoological collection would seem to be required. The dove and the raven were most probably stuffed ones, with some mechanical contrivance to set them flying, and the same would apply to the dove, which would of course represent 'the Holy Goste aredy firo hevyn to fett (fetch) y^e sowle' of St. Meriasek in his death-scene. For they had mechanical devices of some sort. Carew says 'They have therein devils and devices to delight the eye as well as the ear,' and in the 1611 drama of the 'Creation,' which was written during Carew's lifetime, there is the following instructive stage direction, 'Let them (*i.e.*, Lucifer and his angels and St. Michael and his) fight wth swordis and in the end Lucyfer voydeth and goeth downe to hell apareled fowle wth fyre about hem turning to hell and every degre of devylls of lether and spirytis on cordis runing into y^e playne and so remayne ther.' How all these 'devices' and such details as ships—Noah's Ark, for instance, and St. Meriasek's boat—were set on the arena, we have no means of knowing, and as there could have been no curtain they must have been arranged in full view of the audience. No doubt, as on the English stage as late as the time of Shakespeare, and probably later, there was a good deal of make-believe and incomplete illusion. If Carew's account is true, and the actors were really followed about by a prompter, called by him the 'Ordinary,' who recited the words from a book, and the actors did not learn their parts by heart, but repeated the lines after him, it must have been a singularly wearisome performance. There could have been no good acting under such circumstances. But the existing manuscripts do not give any idea that this was the case, and Carew is writing in the latest and most decadent days of the Cornish drama, when perhaps most of the actors were English-speakers. The 'Creation' mentions a functionary called the 'Conveyour,' who is directed to take Eve 'from Adam is syde,' but says nothing of any 'Ordinary.' Carew tells a story of how the prompting method 'once gave occasion to a pleasant

conceyted gentleman of practising a mery pranke,' by repeating, not only the words of the play, but also the directions of the 'Ordinary,' and the 'flat rayling and cursing' which his joke produced from the disconcerted prompter. 'Which trousse though it brake off the Enterlude, yet defrauded not the beholders, but dismissed them with a great deale more sport and laughter than twenty such Guaries could have afforded.'

The costumes and stage properties were not elaborate. The Bishop (High Priest) of Solomon's Temple is directed to put on the vestment of a cleric, and a mitre is handed to him by the king. Urias is dressed in armour for his last battle, and St. John in Gethsemene is 'sindone coopertus' (covered with a linen cloth), but otherwise there are no indications of dress in the 14th century plays. In the 'St. Meriasek' (1504) there are several. 'Here Meriasek weryth a priest ys gown.' 'Her a weryth a rossett mantell and a berd,' 'a visor (mask) aredy upon Constantyn ys face,' to represent leprosy. 'Her Meriasek weryth a gown,' 'A bagyll (crozier) of silver and a myter aredy,' and there are several instances of 'armatores,' armed men, and on one occasion fifteen of them represent an army of fifteen thousand 'with stremers.' In the 1611 'Creation' Adam and Eve before the Fall are 'aparlet in whytt lether in a place appoynted by the conveyour & not to be sene tyll they be called & thei knell & ryse.' Later they are given fig leaves and 'garmentis of skynnes.' Perhaps the more simple-minded 14th century folk would have thought the 'whytt lether' superfluous. As for the 'properties,' except for the dragon and the serpent, they were mostly articles in common use, which might be borrowed from the nearest church, farm or fishing cove, and we may be sure that no efforts were made to avoid anachronisms.

We know nothing of the actors. The name of one is recorded in the 'St. Meriasek' play, 'And John Ergudyn aredy a horse bakke y^t was y^e Justis w^t Constantyn ffor to play y^e marchont,' but we do not know who 'John Ergudyn' may have been. Probably the actors were all local people, not professionals, as is

still the case at Ober-Ammergau. Not many years ago in Brittany, where religious plays have gone on continuously from the Middle Ages, I saw at a little town called Lesneven, about eight miles to the north of Landerneau, a Scriptural drama, 'The Prodigal Son,' excellently performed in Breton by local amateurs, chiefly of the artisan class, trained and stage-managed by a local priest, who had written the play. In language, in style and nearly everything else, except that it was under a roof on an ordinary stage, this was the nearest thing to a Cornish 'Gwary' that one could get nowadays, and I seemed to be looking on at and listening to one of the old time performances of my own country, such as might have taken place in the arena in which we are now standing.

Christian Worship in St. Piran's Oratory in the Sixth and Seventh Centuries.

BY HENRY JENNER, F.S.A.

*A Paper read at the Oratory on July 12, 1911, at the Summer
Excursion of the Royal Cornwall Polytechnic Society.*

AS the history and architecture of this interesting building was very exhaustively treated in a lecture by Mr. Thurstan Peter last year, there is no need for me to say more on that subject than that the building shows marked signs of Irish influence, probably dates back to the 7th century at least, and may be even as early as the 6th. It is possible that it is the actual oratory in which St. Piran himself worshipped. My part will be to try to show you, as nearly as the evidence will allow, what sort of services he and his immediate successors held in it.

St. Piran was an Irishman, one of those many Irish missionaries who came to Cornwall to convert or re-convert the Cornish, and incidentally to form settlements, during the 5th, 6th and 7th centuries. His name was early identified with that of 'Kieran,' by the common change of *k* to *p* in the passage of the name from Gaelic to British, and there is good reason for identifying the Saint himself with St. Kieran of Saighir, the disciple of St. Finian, who is well known in Irish hagiology. In various documents, from the Martyrology of Donegal down to the Irish supplement of the present Roman Breviary and Missal, this Kieran is commemorated on what is certainly St. Piran's day, March 5. It is therefore to be taken for granted that the rite used by St. Piran was the Irish rite, which, however, was substantially the British rite also.

There is very little evidence about the rites of any part of the Christian Church before the 4th century, and hardly any for those of the Celtic part of it before the 6th. It is certain, however, that at that period the rites used in Great Britain and Ireland were not the same as those then in use in Rome, and differed considerably from those introduced here at a later period, which themselves presented only minor local differences from the Roman rite of to-day. And I may say to begin with, that this fact, about which there is no room for two opinions, has no bearings one way or the other on the Anglo-Roman controversy, or on the origins of Celtic Christianity, which had its beginnings at a time when liturgies were in a fluid condition, and when it was impossible to say what belonged to East and what to West. Diversity of rites was the rule in the 6th and 7th centuries, and in those days it does not seem to have occurred to anyone—not even to St. Gregory, with all his centralising policy in other matters—that uniformity, except on very broad lines, was either desirable or attainable. The Celtic rite was a variant of the Hispano-Gallican family—there is documentary evidence as early as the 7th century to show this—a rite which was once in use in Gaul and Spain, and still survives in the Mozarabic Chapel in Toledo Cathedral. It became extinct in Gaul in the time of Charlemagne, somewhere about A.D. 800, when a composite rite, founded on the then existing Roman, with large Gallican additions, took its place, and became the ancestor of the present Roman rite, as well as of the Sarum and other English variants. It was the rite of all Spain from its conversion from Arianism in 589—probably of the Catholics there long before—until it was superseded by the Roman in the last quarter of the 11th century, and with varying fortunes and becoming more and more Romanised as time went on, was the rite of at least some part of the Celtic Church until the Synod of Cashel in 1172. Its origin is unknown. The theories which attribute to it a distinctively Oriental origin beyond that common to all Christian rites are now no longer held by any but mere controversialists, though no one denies that there

may have been borrowings from Eastern sources at a time when inter-communication between East and West was frequent and complete. The best theory, that of Probst, Lucas, Ceriani and others, is that it represents the early rite of the whole Western Patriarchate. Changes took place at Rome, conjecturably in the Pontificate of St. Damasus (366 to 384), but only spread as far as Milan, perhaps by the influence of St. Ambrose, and these were followed by later changes attributed to St. Leo (440 to 461), St. Gelasius (492 to 496), and lastly to St. Gregory (590 to 604), and though the share which these three Popes had in them is not definitely known, three varying Sacramentaries, or Mass-books, are commonly known by their respective names. The third revision was not adopted at Milan, where the second reform, now and for centuries known as the 'Ambrosian rite,' is still in use. The holders of this theory do not, of course, profess to determine whether the earlier rite, now called the 'Hispano-Gallican,' originated in Rome or was adopted there from elsewhere. Either is possible. The theory of Monseigneur Duchesne, set forth in his '*Origines du Culte chrétien*,' is to the effect that an Eastern rite was introduced at Milan by Auxentius, a Cappadocian Arian, the immediate predecessor of St. Ambrose, and spread thence over Gaul and Spain. This conjecture has not been much accepted by liturgiologists, and the old theory that the Gallican rite came from Ephesus, brought by SS. Irenæus and Pothinus, the disciples of St. Polycarp, has been given up altogether, and only survives in unlearned controversies about the ancient British Church.

There is no need, even if there were time for it, to go deeply into the question of the three points of practice which were in dispute between the British Christians and St. Augustine, the Easter, tonsure and baptism questions. Suffice it to say that the Britons, cut off as they had been from the rest of Christendom by the Saxons, were still keeping the old Roman Paschal cycle of 84 years (with the addition of a few mistakes of their own invention), instead of the new and improved cycle of 19 years, which had

been introduced at Rome in 525 by Dionysius Exiguus, and had been agreed upon by all the rest of the Church. It was purely a question of mathematics, the problem being how to reconcile the lunar year of the Jews, on which the Passover depended, with the civil solar year of the Roman Empire, and the Britons were certainly in the wrong. They had also a very unbecoming tonsure, peculiar to themselves, which consisted in shaving the whole of the hair in front of a line drawn from ear to ear, instead of the coronal tonsure of the rest of the West, and there was something wrong, we know not what, with their baptisms. These things were considered to matter, but it is clear from the letters of St. Gregory to St. Augustine, quoted by Bede, that no attempt was then made to interfere with their services in other things, or to force the Roman rite upon them, and there were no differences of doctrine.

There is hardly any documentary evidence for the rites used in the British part of the Celtic Church, but for the Irish part there is a good deal. There is evidence that St. Patrick was long under the influence of St. Germanus of Auxerre, and that the 'Cursus Scotorum,' or Irish form of what would now be called the 'Breviary Offices,' was taught to him in Gaul, and the existing Irish documents are distinctly Gallican in type, though the later ones have alterations in a Roman direction, so clumsily inserted as to be easily distinguished from the original text. The principal documents are :

1. The Turin Fragment, a manuscript of the seventh century, in the Turin Library.

2. The Bangor Antiphoner, a manuscript from the monastery of Bangor, in Down, written (or copied from a manuscript written) during the time of Abbot Cronan (680 to 691). It is now in the Ambrosian Library at Milan. Its contents are similar to those of the book of which the Turin Fragments are all that is left, and consist of canticles, hymns, collects, and antiphons, all with very few exceptions for use in the 'Divine Office,' not in the Mass.

3. The Bobbio Missal, a manuscript of the seventh century, found by Mabillon at Bobbio, originally a Columbanian Irish monastery, but afterwards Benedictine, in North Italy. It is now in the Bibliothèque Nationale at Paris.

4. The Stowe Missal, a manuscript of late eighth or early ninth century, with alterations in a later hand. It is now in the Royal Irish Academy.

5. The Carlsruhe Fragments, eight pages of manuscript of the eighth or early ninth century, containing parts of Masses.

6. The Piacenza Fragments, four pages of probably the tenth century.

7. The Book of Dimma, an eighth century manuscript of the Gospels, in Trinity College, Dublin. It contains an order for the Visitation of the Sick, written on a blank page between two of the Gospels.

8. The Book of Mulling, a manuscript of the Gospels, of the eighth century, in Trinity College, Dublin. It contains also an office for the Unction and Communion of the Sick, and a fragmentary directory or plan of a service.

9. The St. Gallen Fragments, manuscripts of the eighth and ninth centuries, in the Library of St. Gallen. They contain chiefly parts of the Mass.

10. The Basle Fragment, a ninth century leaf, with prayers and hymns on it.

11. The Zurich Fragment, a tenth century leaf, in the Public Library at Zurich, containing part of the office for the profession of a nun.

12. The 'Liber Hymnorum,' a collection of hymns in Latin and Irish, with canticles and prayers. There are two MSS. of this collection, one in Trinity College and one in the Franciscan Convent at Dublin.

13. The Book of Deer, a tenth century Book of the Gospels, once belonging to the Monastery of Deer, in

Buchan, and now in the University Library at Cambridge. It contains part of an order for the Communion of the Sick, with a Gaelic Rubric. This is probably of the eleventh century. It is of course Scottish, not Irish.

14. The 'Leabhar Breac,' or Speckled Book, an Irish manuscript of the fourteenth century, containing a large collection of ecclesiastical and religious pieces, copied from earlier manuscripts, in Irish. The contents are not, as a rule, liturgical, but there is an interesting tract on the ceremonies of the Mass and their meaning, which agrees in most points with a similar tract in the Stowe Missal.

Besides these manuscripts there are many details scattered about in early Irish literature in casual allusions, and there is the evidence of the many Gallican manuscripts, the description of a Gallican Mass by the sixth century St. Germanus of Paris, and the actually living Mozarabic rite, which may be still seen in the Cathedral of Toledo. From all these it is possible to reconstruct a great proportion of at any rate the principal service, that of the Holy Eucharist.

Let us proceed to make the attempt.

The Eucharistic service was called in Latin by the sixth century Celtic Church, as by all the West at that time, 'Missa,' the Mass. It is in its origin rather a meaningless term, of what may be called a sort of liturgical 'slang,' derived from a not very important point which happened to catch the attention, but it is hallowed by the association of centuries. In their own language they used a better word, derived, as some hold, from the Latin 'offerenda,' though I am more inclined to derive it from 'offerentia,' the act of offering, a word which is not often found in any meaning, though Tertullian, among others, uses it, and in this association is only known by its Celtic derivatives, and by the title of the Mozarabic book containing the unchangeable parts of the Mass—'Missale Omnium Offerentium,' probably corrupted from 'Offerentiarum.' So the

Cornish called the service 'Offeren,' as do still the Welsh and the Bretons, and the Irish call it 'Aifreann,' that is to say, the Sacrifice. They said the service in Latin, for there is no evidence of the use of any vernacular liturgy in Britain, or, indeed, anywhere in the West, except, and that is a very large exception indeed, where Latin had become the vernacular, which was throughout Italy, Spain, Gaul, and no doubt a good deal of Roman Britain, as well as in western and middle North Africa. The Eastern practice of translating the liturgy into the languages of newly converted nations was never the practice in the West, probably because they were much less literary and cultivated languages than those with which the Eastern part of the Church first came into contact.

The Mass as St. Piran said it was probably as follows: A bell is rung—a handbell, one of those Celtic bells, of which so many specimens still exist, something like an Alpine cow-bell. The Priest enters, vested in that most simple of garments, the chasuble, a circular piece of stuff, probably rather voluminous, with a hole for the head. Perhaps he called it 'amphibolum.' St. Germanus of Paris gives this as the Gallican word for a chasuble. St. Piran, being a Bishop, carries a staff with a crook to it, probably of bronze. He called it either 'bachall,' which is the Latin baculum (pastorale), which is the name for it still in the Roman Pontifical, or else 'cam bata,' crooked staff, an Irish name, which in the form 'cambutta' is found as far off as a Milan Pontifical of the ninth century. Also he wears some form of that coronal head gear which later developed into the Eastern and Western shapes of the mitre. He proceeds to the east end of the oratory and lays the holy vessels on the altar there. All this, except the mitre, which is not mentioned, may be gathered from the old prophecy given in the 'Tripartite Life' of St. Patrick :

Ticfa tailcend tar muir meircenn:

a bratt tollcend, a chrand cromchend:

a mias inairthiur a tigi:
 frisgerat a muintir huili,
 Amen, amen.

Adze-head shall come across the angry sea:
 His mantle head-holed, his staff crook-headed:
 His dish in the east part of his house,
 All his household shall respond
 Amen, amen.

There is another verse about the building of churches and belfries. This prophecy, which is certainly very early, may well have been composed by someone who had seen Christian clergy in Britain, to warn the Irish of their coming.

Then follows the preparation—'the Making of the Chalice,' as it is often called. The Priest puts a little water into the chalice, three drops, or pourings, saying:

'Peto (or, according to the "Leabhar Breac," quæso) te, Pater, deprecor te, Fili, obsecro te, Spiritus Sancte.' (I pray Thee, O, Father, I supplicate Thee, O, Son, I beseech Thee, O, Holy Ghost), a drop being poured with the mention of each Person of the Holy Trinity.

Then he pours wine into the chalice, saying with each of three pourings: 'Remittit Pater, indulget Filius, miseretur Spiritus Sanctus' (the Father remits, the Son pardons, the Holy Ghost has mercy). He then makes a general confession of sins, and recites a litany of invocations, the choir or congregation responding 'Ora pro nobis' (pray for us) after the name of each saint invoked. The original litany in the Stowe Missal contained only the names of Our Lady, the Apostles and Evangelists, but the slightly later corrector has added thirty-one more, of whom twenty-four are Irish. Then the Priest says three prayers, one of which is by St. Ambrose and another by St. Augustine. The presence of direct invocations of Saints in this service is curious. In the Mass of the Roman rite, though the intercessions of Saints are prayed for, the words, with a very few excep-

tions, chiefly choral portions of the 'propers' on some feasts of Our Lady and a few Saints, are all addressed to God only. The same may be said, with very little exception, of the Eastern rites. The Celts seem to have seen no unfitness in generally introducing direct addresses to Saints into the Eucharist, though only, it is true, into the preparatory prayers.

And now begins the Mass itself. The choir sings the Antiphon or Introit, generally, as elsewhere, made up of Psalm verses.

The Priest says, in the form still used in the Spanish Mozarabic rite, '*Dominus sit semper vobiscum*' (The Lord be always with you), instead of the short '*Dominus vobiscum*' of the Roman. This is followed by a collect, apparently varying with the day.

Then followed the Canticles, which were originally three:

1. The 'Ajus' or 'Trisagion.' This is the form *ἅγιος ὁ Θεός, ἅγιος ὑψιχώρος, ἅγιος ἀθάνατος ἐλέησον ἡμᾶς* (Holy God, Holy Mighty, Holy Immortal, have mercy upon us), which is used in this place in most of the Eastern liturgies, and is sung in Greek and Latin by alternate choirs in the Roman 'Mass of the Presanctified.'
2. The 'Kyrie eleison,' which is in this position in the present Roman rite.
3. The Song of Zacharias, or 'Benedictus.' This is peculiar to the Hispano-Gallican rite.

The first two are sung in Greek, and the third in Latin. By the ninth century the 'Gloria in Excelsis' had taken the place of these three canticles. A prayer, variable with the day, is said by the Priest after the 'Ajus' and 'Benedictus.'

Then come the Lections from Scripture, which are three, as in the Ambrosian rite, and on certain occasions in

the Roman, the Prophecy, which is a lesson from the Old Testament, the Epistle, and the Gospel.

Between the Epistle and the Gospel comes the Gradual, certain verses of Scripture, appropriate to the day, with Alleluias. It was originally so called because it was sung, as it still is in Milan Cathedral, while the Gospeller ascended the steps (*gradus*) of the 'Ambon' or pulpit. While this is being sung, the Priest says certain prayers inaudibly, and half uncovers the chalice. In the Stowe Missal there occurs with the Gradual prayers a sort of 'Bidding Prayer,' or litany, resembling the Greek 'Great Synapte,' and containing intercessions for all sorts and conditions of men. It is entitled '*Deprecatio Sancti Martini pro populo*' (Prayer of St. Martin for the people), and is very like a litany which comes between the Prophecy and Epistle in the Mozarabic rite on Sundays in Lent, and one which take the place of the 'Gloria in Excelsis' during Lent in the Ambrosian rite. It seems to be what St. Germanus of Paris alludes to as following the Homily in the Gallican rite. Its position in the service was somewhat variable.

In later times, as in the Roman rite, the Nicene Creed followed, but this was not so in the seventh century.

If St. Piran or his successor is minded to preach to the people, he probably does so now, and we hear a little Cornish after all this Latin. After the Homily, or sermon, if there are any catechumens or unbaptised persons present he dismisses them. There is no evidence of this being done in any Celtic rite, but St. Germanus, using almost the same words as James of Edessa uses with regard to the Syrian Church, speaks of the Gallican deacons proclaiming the dismissal of catechumens, and in Syria they still did so, 'according to ancient custom,' in the seventh century, though, as James of Edessa says, 'all these things had long disappeared from the Church.' In the Orthodox Eastern Church the custom is still kept up. In the time of St. Isidore (late sixth century) the custom was still used in the

Spanish (what would now be called the 'Mozarabic') rite, but it has vanished out of all Western rites now, leaving no sign of its former presence.

And now begins the 'Missa Fidelium,' or Mass of the Faithful. First comes the solemn offering to God of the bread and wine, with prayers said inaudibly by the Priest, while the choir sings two anthems, the 'Sonus' and the 'Laudes.' The latter, which begins 'Imola Deo sacrificium laudis' (Offer to God the sacrifice of praise) is sung while the Priest lifts up the chalice.

Then follows an exhortation to prayer, or 'Bidding Prayer,' followed by a prayer addressed to God embodying its suggestions. These couplets, bidding prayer addressed to the congregation and prayer addressed to God, are very common in Gallican services. In the Roman rite the long exhortations are compressed into the one word 'Oremus' (Let us pray), except in the Good Friday intercessions, and in the ordination services, which are full of Gallicanisms. Though 'Let us pray' is the common phrase in the Anglican Prayer Book, there are three excellent instances of bidding prayers of quite the Gallican type in the Baptism service.

Now comes the Great Intercession, or 'Nomina' ('Names'). The position of this differs very much in different liturgies. In the Roman the intercession for the living comes immediately before, and that for the dead after the Consecration. The position after the Offertory is peculiar among ancient liturgies to the Hispano-Gallican rite, though that grand piece of prayer-English which is the Anglican Great Intercession, the 'Prayer for the Church Militant,' was moved to a similar place in the Second Prayer Book. One can imagine St. Piran's successor reading out a great list of Irish and Cornish holy men and women here. The Intercession is summed up in the prayer 'Ad Nomina.'

Then follows the sign of Christian unity and fellowship, the 'Pax,' or Kiss of Peace, with its prayer 'Ad Pacem.'

In the Roman rite this ceremony comes much later, and is associated with the reception of Holy Communion. It may be noted the regular word for a kiss of any sort in the Celtic languages, Gaelic, whether Irish, Scottish or Manx, 'pog,' Welsh, Cornish and Breton, 'poc,' is derived from 'pacem,' the accusative case of 'pax,' and must have come from this ceremony. Did not the Celts know how to kiss before the missionaries taught them? That seems improbable, yet there is no doubt about the origin of the word.

And now begins the great Eucharistic Prayer, which is the nucleus of every liturgy, Eastern or Western. Here, as everywhere, it begins with that well-known dialogue between the Priest and people, which we call the 'Sursum Corda.' 'Lift up your hearts,' 'We lift them up unto the Lord.' 'Let us give thanks unto our Lord God.' 'It is meet and right.' The Priest takes up the idea of the last response and elaborates it into a great thanksgiving, which we call the 'Preface,' but which the Gallicans called 'Contestatio' or 'Immolatio,' and the Mozarabs call 'Illatio.' Through a variable passage appropriate to the day, and much more variable than it is in the Roman rite, this leads up to the Hymn of the Seraphim, 'Holy, Holy, Holy, Lord God of Sabaoth. Heaven and earth are full of Thy glory. Hosanna in the Highest. Blessed is He that cometh in the Name of the Lord. Hosanna in the Highest.' Again the words suggest elaboration, and instead of going on to a fixed Canon or Consecration Prayer, as in the Roman rite, the Priest says the 'Post Sanctus,' varying with the day, which, taking up the idea of the Sanctus and Benedictus, usually begins 'Vere sanctus, vere benedictus, Dominus noster Jesus Christus, Filius tuus' (Holy, holy truly blessed is Thy Son, our Lord Jesus Christ), and leads up, through thanksgivings for the work of Redemption, and some passage appropriate to the day, to its climax in the recital of the Institution of the Eucharist. This begins with the Petrine form, 'Qui pridie quam pateretur' (Who the

day before He suffered), not dating the Last Supper, as the Eastern and modern Mozarabic liturgies do, by St. Paul's words, 'In the same night that he was betrayed.' An Irish treatise in the Stowe Missal directs the Priest to bow thrice in penitence at the words, 'acceptit Jesus panem' (Jesus took the bread), and after offering the chalice to God, to sing 'Miserere mei Deus' (Have mercy upon me, O God), and the people to remain kneeling in silence during this, the 'Perilous Prayer' (*Oratio periculosa*)* There are injunctions elsewhere that the Priest must not stumble or pause during his recital. Then he takes three steps backwards, and three forwards. The prayer which follows as a completion of the great Eucharistic Prayer, is called 'Post Pridie,' 'Post Secreta,' or 'Post Mysterium.' It is variable with the day, and occasionally contains words which resemble the Eastern 'Epiklesis,' or Invocation of the Holy Spirit, to complete the Consecration, but often there is nothing of the sort. On the whole the Hispano-Gallican rite does not support the Eastern contention that the Consecration is effected by the Invocation, and that the Roman rite, by having no definite Epiklesis, is invalid. But the discussion is too long and too intricate to go into here.

Then follows the ceremonial Fraction and Commixture. This is usually the breaking of the Host, to symbolise the death of Christ, and the placing of a particle in the chalice to signify the re-union of the Soul and Body at the Resurrection; but in the Celtic rite there is a piece of symbolism which is, curiously enough, only found elsewhere in the liturgy of the most Eastern of Christians, the East Syrians or Nestorians. The Priest breaks the Host into two halves and then re-unites them, to translate the Syriac phrase, 'Joins them together as if they had not been broken.'

* In the canons in a Penitential attributed to Gildas, but probably later, mention is made of "the sacred words where 'periculum' is noted," which seems as if the word may have been written against the consecration formula on the margins of missals.

Then, in the Irish rite, having placed a particle in the chalice, he divides the rest, evidently for the Communicants, into a varying number of portions according to the rank of the day, arranging them on the paten in the form of a cross within a circle.

The Lord's Prayer comes next, preceded by an introductory passage as in the Roman rite, only, unlike the Roman, it varies with the day, and followed by a variable 'Embolismus,' or amplification of the last clause. This arrangement of the Lord's Prayer, with added introduction and 'Embolismus,' is found in a similar position in every liturgy, Eastern or Western, almost the only difference being whether it precedes or follows the Fraction and Commixture.

The Priest then turns to the people and blesses them. St. Piran, being a Bishop, says a benediction varying with the day. A Priest has an invariable form, 'Peace, faith and charity, and the communion of the Body and Blood of Christ be with you always.'

Then, holding up the chalice and paten, he says: 'Sancta Sanctis' (Holy things to the holy), a formula which is found in every rite except the Roman and its derivatives. To it the congregation respond, 'One Father is holy, one Son is holy, one Spirit is holy,' or some variant of this response, such as is found in the Eastern liturgies. No Hispano-Gallican liturgy actually contains this response, but it is evidently what St. Germanus means by the 'Tricanum,' which, according to him, was sung at this point, and of which he gives an explanation of a sort, which fits in with it. In the present Mozarabic rite the words 'Sancta Sanctis' are used in a different connection, being associated with the Commixture.

Then follows the Communion of the people, during which (and that of the Priests) the choir sing communion anthems, which generally include the verse, 'O, taste and see how gracious the Lord is,' or else that well-known hymn:

Sancti, venite, Corpus Christi sumite,
 Sanctum bibentes, quo redempti, Sanguinem.
 Salvati Christi Corpore et Sanguine,
 A quo refecti, laudes dicamus Deo.

Translated by Dr. J. M. Neale (Hymns Ancient and Modern, 313) :

Draw nigh and take the Body of the Lord,
 And drink the holy Blood for you out-poured.
 Saved by that Body and that holy Blood,
 With souls refreshed, we render thanks to God.

The hymn, of which Neale's translation all through is nearly literal, is only found in the seventh century Bangor Antiphoner, but is mentioned in a legend given in the 'Leabhar Breac,' according to which St. Patrick and St. Sechnall heard it sung by angels, and, as the story relates, 'from that time till now that hymn is sung in Eriem when the Body of Christ is received.'

After the Communion comes a thanksgiving anthem (the words of which evidently suggested part of the above hymn), 'Refecti Christi Corpore et Sanguine, te laudamus, Domine, Alleluia' (Refreshed with the Body and Blood of Christ, we praise Thee, O Lord, Alleluia), and a Post-Communion prayer, and then the congregation is dismissed with 'Missa acta est in pace' (The Mass is accomplished in peace.).

This was not the only service held in this oratory, though perhaps the only one much frequented by the laity. St. Piran and his successors probably said here at the proper hours the 'Divine Office,' which may be defined as the recitation of the Psalter, with its accompanying hymns, canticles, antiphons, prayers, etc. This is that daily service, common in varying forms to the whole of Christendom, and traceable back to a very early period, even if it is not, as some think, a legacy from the Synagogue, which the English Church has compressed into its Morning and Evening Prayer.

For the Celtic form of it there is a fair amount of information in the Rule of St. Columbanus, and in the Bangor Antiphoner and the Turin Fragments. There were eight 'Hours' of prayer, that is to say, eight occasions during the twenty-four hours of the day at which a service was said. In practice then, as now, the day was probably not cut up in this way, but the services were grouped together into three or four. The services, according to the Celtic nomenclature, were :

1. 'Ad Duodecimam' (at the Twelfth Hour), also called 'Ad Vespertinum' or Vespers. In Adamnan's Life of St. Columba (III., 23), it is called 'Vespertinalis Missa,' which is one of the rare instances of the word 'Missa' being applied to anything except the Eucharist. The proper hour of Vespers was six o'clock, or sunset, and it is associated with the lighting of the lamps, being called in some rites 'Lucernarium,' or 'lighting-up time.'

2. 'Ad Initium Noctis' (at the beginning of night), answering to Compline. This would be said at about nine o'clock.

3. 'Ad Nocturnum,' or 'Ad Medium Noctis,' the midnight service. This was not the very long service that it is in the Roman rite, but a rather short one, as in the Mozarabic and in the Byzantine rites.

4. 'Ad Matutinum,' said at dawn, answering to what we should now call Lauds, or to the Byzantine *Ὕμνος*.

5. 'Ad Secundam' (at the second hour), about 8 a.m.

6. 'Ad Tertiam' (Terce, or at the third hour), about 9 a.m.

7. 'Ad Sextam' (Sext, or at the sixth hour, or mid-day).

8. 'Ad Nonam' (Nones, or at the ninth hour, or 3 p.m.)

Of these, Vespers and Lauds were the longest. Compline and Midnight were rather shorter, and the rest were, as

now, the 'Lesser Hours.' At the Lesser Hours, three Psalms were said at each; at Vespers, Compline and Midnight, twelve Psalms at each; and at Lauds, a variable number according to the time of year. On Saturday and Sundays from November 1st to March 25th, seventy-five Psalms were said each day at Lauds. From March 25th to June 24th these were diminished by three a week, until a minimum of thirty-six was reached. This went on for about five weeks, and then the number was increased weekly until November 1st again. On other days there was a maximum of thirty-six, and a minimum of twenty-four. The object evidently was to give occupation in the long dark mornings when outdoor work was impossible, for a monk must never be idle. With the Psalms came canticles, lessons, collects, antiphons, and hymns. As in the other rites, a very large proportion of the canticles, lessons, and antiphons was made up of Holy Scripture, and probably, as is still the case in the eminently Scripture-loving Roman Church, nearly the whole of the Bible was got into these services somehow or other. We have no record as to whether the laity attended these Hours very much, though we know very well that they attended them freely in the later pre-Reformation period. The seventh century Cornish must have been very pious laity to stand half the Psalter at a stretch on a winter's morning.

No doubt St. Piran and his successors baptized and visited the sick, and we know fairly well how they did so. The ceremonies at their Baptisms were very like those to be seen in the Roman rite now, the exorcisms, the signing with the Cross, the use of salt, the 'Ephphetha' ceremony, repeating Our Lord's acts and words at the healing of the deaf and dumb man, the anointings with oil and chrism, the confession of faith, the vesting in the white robe, but apparently not the delivery of the lighted taper. There were also the peculiarly Hispano-Gallican ceremonies of the washing of the feet after baptism, derived from Our Lord's

words in St. John xiii., 10, and the signing of the Cross on the palm of the hand. Something, in the opinion of St. Augustine and his companions, was wrong with the Celtic baptisms, but it is not recorded what it was. There seems reason to think, from a sentence in a letter from Pope Zacharias to St. Boniface, that the Celtic Church was thought not to be careful enough to baptize in the Name of the Trinity, and sometimes made use of an invalid formula. The formula given in the Bobbio Sacramentary is valid enough to satisfy anyone.

When the Priest visited a sick man he anointed him with oil, according to the directions of St. James. The words used were not those now in use, but a form which was not only Gallican but also Ambrosian (Milanese) and Venetian until the sixteenth century. The Holy Communion was brought from the Church to the sick man, and from the wording of the form of administration it would seem that the two Species were given together, as in the Byzantine rite of the present day, or else that it was administered in one kind only.

We may be sure that St. Piran introduced his converts to the Irish custom of lighting up the New Fire on Easter Eve, and that, long before Rome ever thought of copying this beautiful symbolism from the Celts, the New Fire was struck from a flint in the doorway of this little oratory, to signify the Resurrection of the true Light of the World, and the Paschal Candle was lighted from the 'Lumen Christi.'

The time came when the ways of this oratory were changed. The Celtic Mass ceased to be used. Easter was kept on the right day, the Cornish priests consented to cut their hair like other people, whatever was wrong with their baptisms was put right, and so Cornwall, like the rest of Celtia, fell into line with the Western Church generally. By the time of the Norman Conquest, it is probable that the services in St. Piran's Oratory would seem, to any but an observer highly skilled in detail, just the same as what may

be seen in St. Piran's Church at Truro to-day. Perhaps it was just as well. The Celtic rite, as far as we can reconstruct it, was a complicated and rather muddled rite, and its sensuous, diffuse, and exuberant prayers were in great contrast to the clear, crisp, and dignified utterances of the sober and restrained Roman rite. Perhaps from an archæological point of view one may be allowed to regret its extinction—if only they could have kept it going in just one church, like its sister the Mozarabic. And so things continued in this oratory until the sand came and swallowed it up, for apparently the little building did not live to see that other and greater change, of the merits of which, if it had any, I shall not speak, for that way controversy lies.

This, then, is a description, founded on reasonable conjectures from a fair amount of evidence, of the sort of services that were held in this oratory in the sixth and seventh centuries, and for how much later we have no means of knowing. I do not say whether they were better or worse than what may be seen in churches and chapels of all sorts in Cornwall at the present day. That form of criticism does not come into my subject. But this much is certain, that these services were used by good and holy men, who in the best of good faith worshipped God in the way which to them seemed best, and to whom Cornwall undoubtedly owes a very deep debt of gratitude, however much some of us may think that we have out-grown their manner of worship.

Some Historical and other Notices of Mining in the Northern Part of the Parish of St. Agnes.

BY J. H. COLLINS, F.G.S.

This parish includes one of the oldest mining districts in Cornwall, yet even now mining there may be said to be in its infancy as regards tin ores. That already wrought is probably far less than that which remains *in situ*, since no greater vertical range has been reached, even in Wheal Kitty, than about 750 feet. The geology, mineralogy, and petrology of St. Agnes, together with the results of the mining operations which have been carried on there for centuries, have been described in great detail by a large number of competent observers, much of whose work, supplemented as it has been by the recent official Geological Survey, has been very usefully summarised in the Memoirs of the Survey, and especially in that prepared by Messrs. Clement Reid, J. B. Scrivener, J. S. Flett, and others*. In the following remarks I shall deal exclusively with the mines, and chiefly with those existing in the northern part of the parish, which is nearly 9,000 acres in extent. The best part of it appears to be the central portion of the northern belt, which extends along the north coast from Porthtowan to Cligga, a line about four miles long, with an average breadth of one mile. Here, besides stockworks, of which there are several, there are some lodes yielding copper, and many more yielding tin. These latter, though usually small, rarely, indeed, exceeding two feet in thickness, are often more than ordinarily rich,

* See the Geology of the country near Newquay (1906).

while their inclination is such, often only 20 or 30 feet from the horizontal, and sometimes less, that they may be worked by modified bed-mining methods. They exist, too, at very moderate depths below the surface, and though often faulted, the faults are rarely of such extent as to cause serious inconvenience when the works are wisely laid out. Furthermore, the quantity of water to be raised is not excessive, and the rocks, though hard at times, are only moderately so.

Many of the mines are clustered about St. Agnes Beacon, a hill of highly metamorphosed killas with a core of granite. The killas lies generally at a low angle, with a strike somewhat to the north of east and dip to the south of west. Except in one case near the coast, elvans are seldom met with in the mines or cliffs.

One important drawback to mining in a great part of the parish hitherto has been that the ownership of the mineral and surface rights is very much split up, so that much costly negotiation is often necessary before the right to work a mine can be obtained, while the area finally secured is often too small to allow of that development by modern methods and modern appliances which alone can be expected to ensure economic success.

The miners of St. Agnes are not less skilful than those of other parts of the West of England, but it must be confessed that the methods employed and the appliances in use are, or until recently have been, with one or two exceptions, decidedly antiquated. A system of vertical shafts and well-placed cross-cuts seems best adapted to give access to the numerous lodes. Great care, however, has to be taken in determining the depths of the cross-cuts, otherwise they may miss the more important of the so-called 'flat' lodes altogether. In this connection it may here be remarked that several of the best lodes, such as the Wheal Kitty and West Kitty main lodes, do not outcrop at the surface at all. The lodes are fairly continuous, except where they are intersected by faults, 'gozzan-slides,' or 'cross-courses,' the

former being very numerous, but not in all respects disadvantageous. The land on each side of the Trevaunance Valley has so far proved the richest in the parish. Here several famous mines have been worked for centuries, the whole being at present controlled by the owners of Wheal Kitty, and by the St. Agnes Consolidated Mines, which control also the neighbouring West Kitty. This area of less than 1,000 acres, from workings not exceeding an average depth of 100 fathoms, and nowhere so much as 150 fathoms from the surface, has yielded, according to actual records during the past sixty years, tin ores to the value of considerable more than one-and-a-half million sterling. Previous to that date it must have yielded at least as much, and I doubt not that in the not distant future the production will be greater than in the past. The produce of this area has been chiefly tin ore, although not inconsiderable quantities of copper ore have been met with from time to time. The tin has always been noted for its purity. 'Stean St. Agnes, an gwellas stean en Kernow'—'The tin of St. Agnes is the best tin in Cornwall'—is a very old saying and a true one.

WHEAL KITTY AND PENHALLS UNITED.—This group, which is on the east side of Trevaunance Valley, includes some very ancient mines, some of the workings of which are known to be as much as 200 years old. The following account of the most notable workings was given by the writer to the members of the Royal Cornwall Polytechnic Society on the occasion of their visit in June, 1911: From where we are now standing (the top of one of the ancient burrows near the account house), northward to the sea, westward to the Trevaunance Valley, eastward to the Trevellas Valley, and southward almost to the railway, and comprising such old mines as Wheal Pink, Wheal Vottle, Goonlaze, and Wheal Osborne, all have for many years past been worked together as Wheal Kitty, which now also includes Penhalls and Gooninnis. We have, therefore, 'ample

room and verge enough' for great extensions of our works as soon as our fine new central shaft is completed, and this will now be very soon.

Although we have provided and erected a great deal of first-class machinery for future working, most of our work at present is done by means of the old machinery. The old winding engine is so situated that we can at will draw from four shafts, known as Wheal Vottle, New Shaft, Sunny Corner, and Old Sump. At present the greater part of our ore supply comes through the Vottle shaft. Eastward from Sunny Corner shaft is a large extent of virgin ground which is opening up well at the adit level, as well as above and below it.

Our old pumping engine (now (1912) superseded by the larger one at Sara's Shaft) is employed in raising dressing and boiler water, of which we require not less than from 1,500 to 2,000 tons per day. At New Shaft powerful ram pumps, operated from our electrical power station, are installed at the 65-fathom level; these are for the present being held in reserve. The power station and equipment will, of course, be available for the extension of our crushing plant as soon as we are ready for it. The stamps and dressing floors are old-fashioned, but very effective. If we had a much larger water supply we could bring them up a little more to date, and this we expect to be able to do before long. For the present they are doing excellent work, and we have no reason to apologise for them.

Our future, however, is bound up with the fine central shaft known as Sara's. This is a four-compartment vertical shaft, containing double cage road, ladder way and pump way. It is fitted with 18-inch plunger lifts and 17-inch rising main, all of the best and most substantial character and to be operated by the 65-inch Cornish engine now nearly ready for work. At this shaft we have a first-rate compound winding engine, also an air compressor and powerful capstan engine, all supplied with steam from two very large Lancashire

boilers. We are driving a cross-cut at the 540-feet level to connect these workings with the old workings around Holgate's shaft, and at the same time to open up the stamps lode, which has not been seen south of the great slide below the adit level. This lode has since been intersected in the cross-cut, and is now (May, 1912) being worked on.

I have remarked on the great antiquity of this group of mines. Wheal Pink was a mine of some importance so far back as 1778, for Pryce refers to 'ore lying unsold at surface,' presumably for lack of stamping and dressing plant. Wheal Vottle was over 50 fathoms deep and employed 258 people in 1838. No statistics of production are available of earlier date than 1853, except as regards certain small sales of copper, but the following figures are authoritative :

1853-60,	sold	1163	tons of black tin for	£78,071
1861-70	„	1838	„ „	122,011
1871-80	„	2097	„ „	123,424
1881-90	„	1568	„ „	91,837
1891-1900	„	1351	„ „	71,399
1901-10	„	1357	„ „	115,615
1911	„	172	„ „	8,512
1834-96	„	2024	tons of copper ore for	13,384

In addition, there have been sundry sales of iron pyrites and blende.

The sales, during what is less than two-thirds of the mine's existence, to date thus aggregate well over £600,000 ; probably the value of the total output has not been less than one million sterling. How much of this has been profit it is quite impossible to say ; there have been periods of brilliant prosperity and others of adversity. Thus, an advertisement offering for sale one hundred and twenty-eight shares in Wheal Kitty ('Mining Journal,' August 23, 1836) says the mine is 'paying regular dividends.'

In 1904 the old Cost Book Company came to an end after some years of losses. The mine was purchased as a going concern by the firm of J. H. Collins and Sons, who

formed a new Cost Book Company, and spent several thousands of pounds in opening up new ground and supplying additional equipment. The adjoining sett of Penhalls (and later Gooninnis) was acquired, and the present company was registered in 1907, with a capital of £35,000, of which even now some thousands remain to be issued.

The Penhalls Mine, which, as yet, we have hardly touched, is also very ancient and has also a good history. There are no records from which we can learn anything as to its early workings, but after a period of abandonment it was re-opened in 1858, and in 1864 had reached a depth of 60 fathoms below adit (40 fathoms) on the very flat underlie of the lode, and had a 50-inch engine for pumping and a 56-inch engine for stamping. In 1870 it had reached the 125-fathom level and employed 238 people. From 1859 to 1884, when the mine was closed down, it had yielded 3,601 tons of black tin, which sold for £213,658, besides some copper ore.

GOONINNIS adjoins Wheal Kitty and West Kitty on the south. It has been more or less prospected at several times and by several companies, and is now being explored by the Wheal Kitty and Penhalls Co. from their Wheal Vottle workings, the production being included in Wheal Kitty general returns.

The great scheme of extension and development which was projected in 1907 is now nearing completion, and in the near future Sara's shaft, about the centre of the group, will also be the main outlet for all parts of the workings. The operations of the Limited Company from its commencement in September, 1906, to December, 1911, are well summarised in the following table :

Capital issued (increasing from £19,848 to		
£32,199, average for period, say	£26,000	
Capital expenditure during the period	28,565	
Realised profits (net, after deducting royalties, etc.)	15,903	
Dividends paid	5,829	
Royalties paid	4,041	

Undivided profits, applied in aid of capital

extensions expenditure	...	...	...	6,033
Tin stuff treated	...	...	...	62,007 tons
Black tin recovered	...	...	...	953 tons
Average produce	...	...	...	34½lbs. per ton
Development footage	14,176 feet,	equal to 1 foot	for each	
	4.37 tons.			
Average profit per ton	...	...	...	5s. 1½d.

WEST KITTY MINES, Ltd. This group adjoins Wheal Kitty group to the westward. A great many ancient mining setts are included under this title, there having been at one time more than thirty separate leases, the principal having been known as Wheal Rock, Wheal Coit, and Wheal Friendly, with parts of the old Wheal Primrose and West Pink. Under these various names much tin had been raised and sold from time to time, until about the year 1868, when several of the properties were amalgamated as West Kitty Mines. Driving westward from Reynolds's shaft, towards the Beacon, rich bodies of ore were discovered, and from this part of the property, as also from Thomas's section immediately to the south. In the year 1880 large returns began and continued to be made for nearly a generation, and, indeed, until quite recently. In 1909 the old Cost Book Company was converted into West Kitty Mines, Ltd., with a nominal capital of £25,000, the object being to secure the financial assistance of the National Minerals Corporation, Ltd., and the St. Agnes Consolidated Mines, Ltd. The first-named company is in possession and is working the mines, but the old Cost Book Company has not yet* (December, 1911) been liquidated. The recorded production is as under :

1881-1890,	sold	3005 tons of black tin	for	£176,199
1891-1900	„	3815	„ „	207,960
1901-1910	„	3295	„ „	280,025
1911	„	82	„ „	7,229
1881-1910	„	185 tons of copper ore	for	1,405

* Nor even yet (June, 1912).

Thus it appears that this group in thirty years has yielded ores to the value of £672,818, besides what the old mines absorbed and amalgamated, had produced ; probably not far from one million sterling has been obtained from this group. The total of calls (1868 to 1908) is said to have been only £30,000, and the dividends £160,000.

WHEAL FRIENDLY, which lies to the north of Wheal Kitty proper, was once known as West Pink, and was worked for some years in connection with Wheal Primrose. From 1831 to 1833 West Pink sold 226 tons of copper ore for £1,344, and later 54 tons more, the value of which is not recorded. In 1843 Wheal Friendly was sunk to the 66-fathom level (below adit, about 30), on the underlie ; in 1870 it was the same depth, but only working above adit, and so continued to 1877 ; in 1900 it was re-opened as part of West Kitty ; and in 1910 it had reached the 80-fathom level. The following returns have been made :

1855-60	Black tin, 40 tons	...	...	£5,653
1861-70	„ 216 „	...	...	13,040
1871-77	„ 50 „	...	...	2,602

The mine has also yielded small quantities of copper and lead ores—the latter from a vein coursing 20 degrees East of North, dipping eastward steeply, and heaving both gozzan slides and lodes. The produce since 1900 has been included in that of West Kitty.

THE POLBERRO MINES, known at different times at Royal Polberro, West Polberro, and Polberro Consols, lie to the north of the West Kitty group. A great many mines are or have been included under these titles, among them Seal Hole and North Seal Hole, East Pell, North Pell, Dolga (or Carnmeal), Turnavore, Wheal Squidler, Trevaunance, Wheal Prosper, Wheal Park, East Trevaunance, Wheal Hope, Old Polberro, Wheal Sperres, Wheal Kine, Wheal Paul, Balnoon, Wheal Ferrol, Wheal Bungay, etc. All

these are now included in the holdings of St. Agnes Consols. Polberro was already a very important mine in 1750.

Writing in 1843, Mr. J. Y. Watson says: 'It was formerly one of the richest tin mines in Cornwall. In 1750 the tin ore in this mine, consisting principally of large-grained crystals, was so abundant in several parallel and contiguous veins, that they could not find horses enough in the neighbourhood to carry it to the smelting house, and were compelled to take it away in carts. A considerable part of these ores was so rich that it did not require to be stamped, and large blocks of tin-stone were obtained. In March, 1750, one was taken to Killinek (Calenick) smelting house, weighing 664 lbs., and was so rich that it yielded $11\frac{1}{2}$ for 20 ($57\frac{1}{2}$ per cent.) without stamping or dressing. Another block . . . weighed 1200 lbs.'

Writing a little earlier, but of a much later period, Mr. Henwood says: 'The excavations have been so numerous and extensive that a mass of rock, extending from the surface to 60 fathoms deep, being unsupported, is now (1838) slowly subsiding. The portion thus in motion is perhaps 60 or 80 fathoms in diameter, and its descent at the rate of 6 or 8 feet in a month. The miners still continue their labours in the moving mass.' (Trans. R.G.S.C., V, p. 101.)

The later workings of this group of mines have been less extensive and less profitable. In 1838, 478 people were employed here, and in 1870 250 people. In 1864 the deepest workings were 50 fathoms below adit (50 fathoms). There were a 60-inch pumping, 36-inch stamping, and 22-inch and 16-inch winding engine. Polberro has been idle, or nearly so, for a good many years, but as it now forms a part of the St. Agnes Consolidated property, we may hope that work will be resumed there, and on a large scale, before long. The following sales are on record:

1837-9 and 1849-95, sold 4,310 tons of black tin for about £310,000; 1849-54, 1,052 tons of copper ore for £3,946; also 205 tons of copper ore, value not stated, besides certain parcels of blende and iron pyrites.

Many other sales from this area have been made, some of which have been imperfectly recorded under the various names given above.

ST. AGNES CONSOLIDATED MINES, LTD. This recently formed company, besides controlling the West Kitty and Polberro Mines, holds licenses to work Polbreen, Penwin-nick, West Polbreen, St. Agnes Wells, Wheal Freedom, Blue Hills, East Blue Hills, Wheal Prudence, and other setts in this northern St. Agnes mineral belt.

POLBREEN, one of the mines once known as New Wheal Kitty, lies to the west of West Kitty. It is a very ancient mine, and in 1838 had a 50-inch pumping engine and employed eighty people. In 1864 it was 52 fathoms below adit (30), and had 34-inch pumping and 13-inch stamping engine. In 1870 it was 60 fathoms below adit. It has since been stopped and re-started as New Polbreen, but with no great advantage. In the years 1839, 1858, and 1887, it sold 520 tons of black tin, and 1829-36, and 1840 it sold 250 tons of copper ore. The adjoining West Polbreen, 1872-89, sold 10 tons of black tin. Both are now idle

PENWINNICK, once known as Great West Kitty, sold—1831-3, 673 tons of copper ore for £2,284.

BLUE HILLS AND EAST BLUE HILLS lie immediately to the east of Penhalls. In 1870 Blue Hills was 40 fathoms deep (below adit). The following sales have been recorded :

1858-1897, sold 2,117 tons of black tin for £116,746 (Blue Hills).

1881-1893, sold 310 tons of black tin (East Blue Hills).

The foregoing remarks relate for the most part only to the central portion of the northern mineral belt of St Agnes Parish, about one square mile in area. Wheal Coates and other tin mines to the west of the Beacon, and Wheal Prudence, to the eastward, are not here considered. Nor

are we concerned with the once rich Towan, Charlotte, Tywarnhayle, and Music copper mines, which are situated more to the south and west. From our own particular district, and not counting the ore sold before 1837, it would appear that this rich square mile has yielded tin ores alone to a value of close on two million sterling. What was the yield in earlier days can only be guessed at from the notices met with in the works of the old writers, but it was probably at least as much.*

* Trevaunance alone, from an area of 3 acres, is said to have given *profits* to the extent of £200,000.

Portrait Gallery of the Royal Cornwall Polytechnic Society.

1.—SIR CHARLES LEMON, Bart., M.A., F.R.S.

First President (1833-67).

‘ He was ever ready to give cordial and influential help to all its [Royal Cornwall Polytechnic Society’s] attempts to promote the industrial welfare of the county, and to foster genius and talent in any branch of art and science.’

These words, from the brief obituary notice of Sir Charles Lemon which was read at the Annual Meeting of the Royal Cornwall Polytechnic Society, March 12, 1868, sum up concisely the role which the subject of this notice played in his native county for a period of nearly half a century. Unlike many of those with whom he was closely associated, he has left only a scanty literature by which to enable future generations to gauge his versatility; yet among that company of intellectuals in art, literature, and science who shed lustre on Cornwall during the early Victorian Era few have left a more abiding mark.

To have rescued from obscurity and placed among workers of first rank talent that has enriched human thought and enlarged the sphere of action: to have given a new lease to struggling industries, revived a few that were moribund, and called new ones into being; and to have lent a sympathetic ear and a ready purse to the wails of distressed humanity, is to have deserved much from posterity. All this, and more to the same effect, can be said of the last male

representative of a name which for a century and a half was closely and honourably associated with almost every phase of the public and industrial life of Cornwall.

Sir Charles Lemon, who was born on September 3, 1784, was the third son of Sir William Lemon, the first baronet, and the great-grandson of 'The great Mr. Lemon,' who, by a shrewd business acumen and tireless industry, established the fortunes of the family. He was married on December 5, 1810, to Charlotte Anne Fox-Strangways, youngest daughter of Henry Thomas, second Earl of Ilchester, by whom he had three children. His eldest son, Charles William, was born on November 4, 1811, and died on November 23 in the following year. Another son, also called Charles William, born on May 10, 1813, was drowned at Harrow on April 18, 1826. Charlotte Augusta Caroline, the third child, died at Aix in Savoy on May 20, 1825, at the age of nine.

Sir Charles succeeded to the family patrimony on the death of his father on December 11, 1824. Nine years later he graduated M.A. at Trinity College, Cambridge. For scientific pursuits he evinced an early love, and his administrative abilities found fit employment as president of the three leading scientific societies of Cornwall, a position which he filled in each case during a greater number of years than any other holder of the office. He was president of the Royal Institution of Cornwall from 1830 to 1857; of the Royal Cornwall Polytechnic Society from its formation, in 1833, to 1867; and of the Royal Geological Society of Cornwall from 1841 to 1857. From 1836 to 1838 he was president of the Royal Statistical Society, and he was a vice-president of the Plymouth Meeting of the British Association held in 1841. He represented Penryn in the House of Commons from 1807 to 1812 was Member for Cornwall 1831-2, and with a very short interval he served West Cornwall in the same capacity from 1832 to 1857.

During the early years of the Royal Cornwall Polytechnic Society Sir Charles offered for competition several liberal premiums, and in 1844 the Society marked its appreciation of his great service by presenting him with a gold medal. In the Society's efforts to reduce the appalling death roll in Cornish mines, more especially by the introduction of the Man Engine, he played an active part. He will also be remembered with gratitude for his exertions in finding fitting sphere for the talent of a number of young men of humble birth. By him Burnard, the mason boy, was started on what became a brilliant, if somewhat sad career as a sculptor. With books and instruments he aided Peach the coastguard in his geological and zoological researches. Silas Rice, a Budoek house painter, he took under his patronage, until, after superintending the School of Design in Edinburgh, he was selected to prepare the frescoes for Queen Victoria's summer house at Buckingham Palace. He it was also who introduced to Mr. Veitch the brothers William and Thomas Lobb, men who ransacked the wilds of South America and the Malayan Peninsula for treasures for the English greenhouse and garden.

To the Royal Cornwall Polytechnic Society Sir Charles presented a marble medallion of himself and busts of Dr. Borlase and C. W. Peach. His own portrait, painted and presented by Sydney Hodges, a former secretary of the Society, hangs in the Library room, and a cast of Burnard's bust of Sir Charles will be found in the Hall.

An attempt by Sir Charles to establish at Truro a School of Mines befitting a county where metalliferous mining was one of the chief industries was not successful. He offered to give a site for the building, £500 to the Building Fund, and to leave £10,000, or even £20,000 (if required) to trustees for the maintenance of the school. The experimental stage of the movement proved that the promoter was far in advance of his time. The Technical School at Truro, dedicated to Sir Charles, is a tardy acknowledgment of his prescience and liberality.

One of Sir Charles' chief interests was the improvement of his gardens at Carelew. In 1830 he engaged as gardener William Beattie Booth, under whose skill most of the gardens and shrubberies as they now appear were planned. Booth was a good botanist and a clever gardener, and for twenty-three years he waved a wizard's wand over Carelew. Under his care some of the first Himalayan Rhododendrons grown in this country in the open were introduced, and there many of them may be seen to-day, objects of striking beauty. William and Thomas Lobb both served their apprenticeship under Booth, and were much encouraged in their studies by the owner of Carelew.

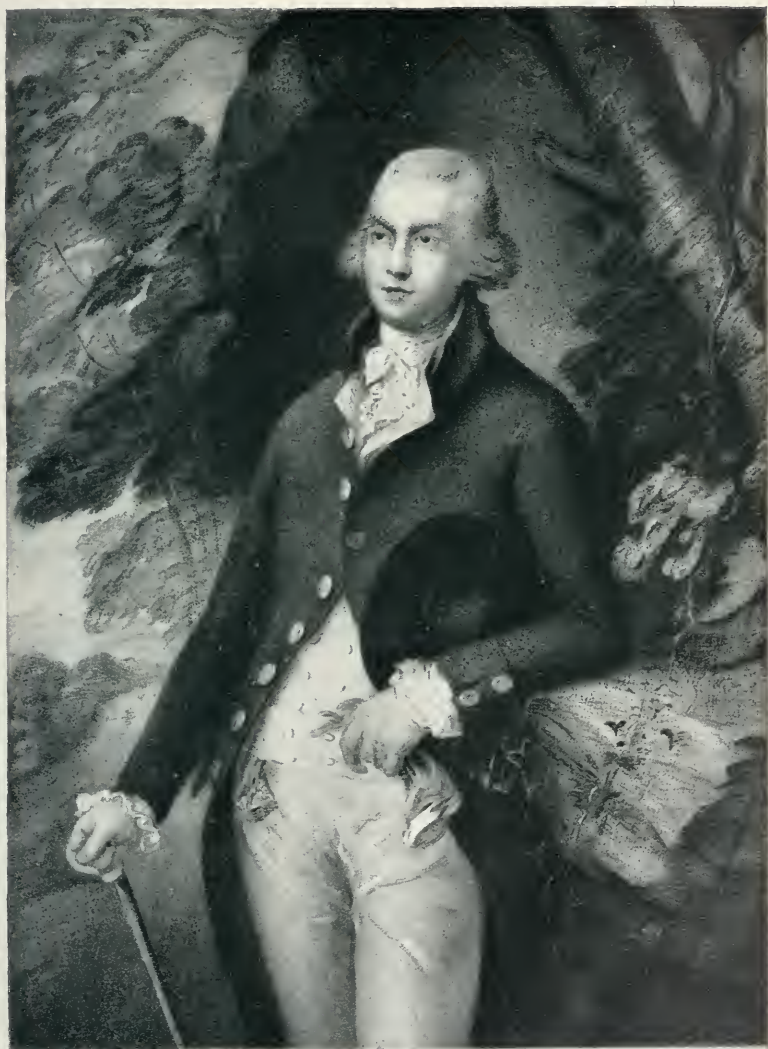
Sir Charles died on February 12, 1868, in his eighty-fourth year. Among celebrities whose close friendship he enjoyed were Sir W. J. Hooker, Professor Owen, the Chevalier Bunsen, Carlyle, Henry Hallam, Dr. Whewell, Dean Milman, Tennyson, Sir Roderick Murchison, Sir Henry de la Beche, and Robert Were Fox.

To Mr. Wilson L. Fox we are indebted for our frontispiece, which is from an engraving of Sydney Hodges' painting.

2.—LORD de DUNSTANVILLE.

First Patron (1833-5).

Francis Basset, afterwards Lord de Dunstanville, was born and moved among stirring times. Bearing this fact in mind, it is not to be wondered at that, coming from an ancestry which included warriors and statesmen, and himself endowed with unusually brilliant parts, he should have been closely identified with the more important activities of his time, whether of peace or of war. The qualities which won the



Thos. Gainsborough R.A.

G.H. Every

LORD DE DUNSTANVILLE.

First Patron Royal Cornwall Polytechnic Society.

(1833-5).



Bassetts their escutcheon and assured them a place on history's page were more or less recapitulated in the career of that worthy representative of the family, who was the first as well as the last to bear the proud name of de Dunstanville.

Francis Basset, son of that Francis Basset who was M.P. for Penryn from 1766 to 1769, was born at Walcot, in Oxfordshire, on August 9, 1757. After a period under private tutors, his education was continued at Harrow and Eton, followed by the usual course at King's College, Cambridge, where he received his M.A. degree at the age of twenty-nine. A tour on the Continent, in the company of the Rev. William Sandys, whose father had acted as steward to the Basset family, gave him first-hand information on the social and political condition of the countries through which he travelled, and was a splendid preparation for the part he was soon to play in the public life of his own land.

At the close of 1778 Spain allied itself with France and America against England. For months vague rumours continued to reach this country of the two Continental powers mobilizing their fleets for a concerted attack at some vulnerable point along the south coast, and from Kent to Cornwall there were constant alarms. During August of 1779 Plymouth was threatened, and Francis Basset won his spurs by marching to that town his own division of the Cornish Miners' Militia and throwing up sufficient earthworks to ensure the safety of the port. Basset was then only twenty-two years of age, and for his spirited conduct he was created a baronet.

In 1780 he commenced his political career by being returned to the House of Commons as Member for Penryn. If the truth must be told, Sir Francis Basset was no better, and perhaps no whit worse, than the majority of the politicians of that period. At any rate, it is as certain as anything connected with the political history of one of the most notorious of Cornish boroughs can be, that almost at

the very outset of his candidature Sir Francis entertained the whole town to something like a royal feast, and that from the time of his maiden speech to the day when, in deep disgust, he shook the dust of the place from his feet, he spent enormous sums of money to keep the seat for himself or for his nominees. In 1802 he is said to have secured the representation for the man of his choice by the novel expedient of putting faggot-voters on the poor-rates the night before the election. From a letter written by the Hon. Mrs. Boscawen to the celebrated Mrs. Delany, we gather that in 1784 Sir Francis ran 'moveable candidates' for the boroughs of Truro, Tregony, and Mitchell.

Amid a multitude of other interests, Sir Francis found time to write a number of pamphlets on political, agricultural, and mining topics. Many of them were published anonymously, and they all reveal a shrewd perception as well as considerable polemical ability. They include 'Thoughts on Equal Representation,' 'Observations on the Treaty of Commerce between Great Britain and France,' 'Thoughts on the Theory and Practice of the French Constitution,' and 'The Crimes of Democracy.' To Arthur Young's 'Annals of Agriculture' he contributed articles which attracted much attention, on such subjects as 'Experiments in Agriculture,' 'A Fat Ox,' 'Crops and Prices,' 'Crops in Cornwall,' 'Mildew.' In 1811 he published a new edition of Carew's 'Survey of Cornwall.'

Sir Francis Basset's first wife, a Miss Frances S. Basset, died in 1823; his second wife, whom he married on July 13, 1824, was Harriet, sister of Sir Charles Lemon.

On June 17, 1796, he was raised to the peerage as Baron de Dunstanville of Tehidy, and on October 30, 1797, he was created Baron Basset of Stratton. In consequence of having taken his seat in the House of Lords before he had made the statutory oaths and declarations, it became neces-

sary to pass a private Act of Parliament to relieve Lord de Dunstanville of certain penalties.

Lord de Dunstanville was one of the most generous patrons of Opie the painter, and when the remains of that genius were accorded a national interment in St. Paul's Cathedral, Lord de Dunstanville was one of the pall-bearers. He himself possessed a fine taste in all matters of art, and his London and Cornish residences were liberally adorned with rare paintings.

A tablet in the Royal Cornwall Infirmary at Truro, founded in 1779, the year in which Lord de Dunstanville made his famous march to Plymouth, states 'the establishment, permanency, and usefulness of the charity to be chiefly due to the munificent liberality and unwearied exertions of Francis, Lord de Dunstanville.'

Portreath, known to a former generation as Basset's Cove, was almost a creation of Lord de Dunstanville. He fortified the place with one battery of four 12-pounders and another of two 6-pounders, though for what purpose is not now quite clear. Cornish mining found in him a strong supporter. In 1809 he laid the first rail of a tramway to connect Portreath with Gwennap copper mines, then almost at the zenith of their prosperity.

This eminent Cornishman, who in his time had played many parts, died in London on February 5, 1835, at the age of seventy-seven, leaving a widow and one daughter, the latter becoming Baroness Basset of Stratton. He was buried at Illogan, and a monument in the Church, bearing a portrait by Westmacott, sets forth that the deceased was 'A sincere Christian, an elegant scholar, the patron of merit, and a magnificent contributor to charitable institutions throughout the Empire.' It is said that the funeral procession from London to Tehidy was one of much splendour. With its outriders and ten pages on horseback it accomplished the journey of about 320 miles in twelve days. A

desire for some public expression of gratitude for what Lord de Dunstanville had done for his native county culminated in the erection on the summit of Carn Brea Hill, near Redruth, of one of the most inelegant monuments ever raised to the memory of a great man.

When the Royal Cornwall Polytechnic Society was started, Lord de Dunstanville readily acceded to the wish of its promoters by becoming its first patron. At his death this office was filled by King William IV, and ever since the Society has been favoured with the gracious patronage of each succeeding occupier of the Throne. Among the busts of worthies which adorn the gallery of the Polytechnic Hall, Falmouth, is one of Lord de Dunstanville, presented in 1847 by his widow.

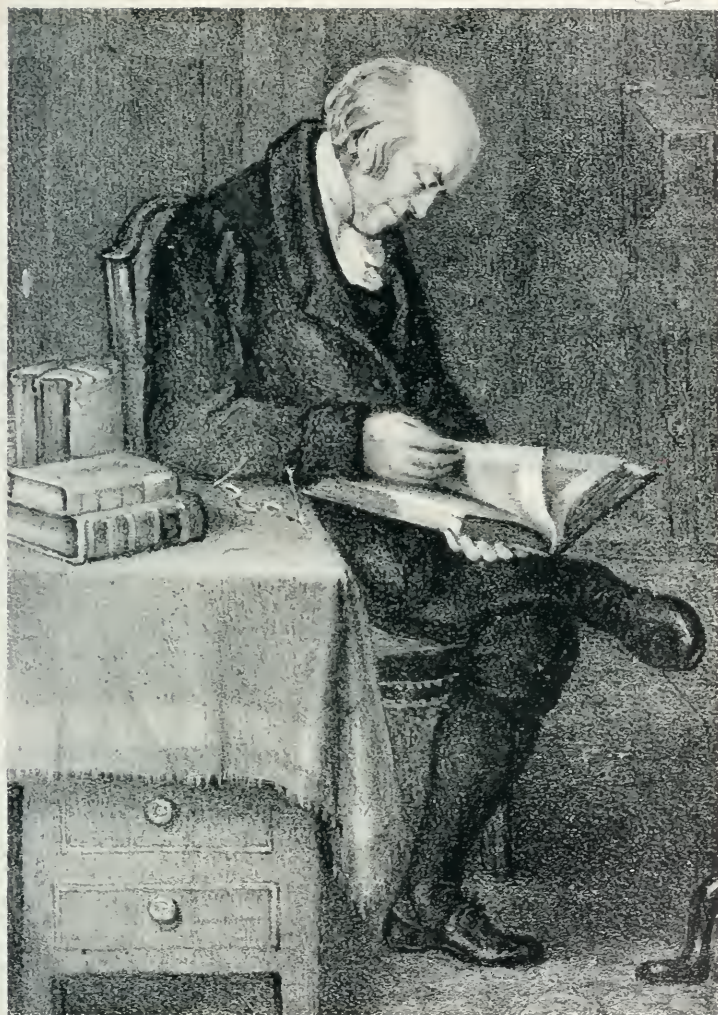
The accompanying portrait is reproduced from an engraving of Gainsborough's painting, kindly lent by Mr. J. D. Enys.

3.—DAVIES GILBERT, M.A., D.C.L., P.R.S.

First Vice-Patron (1834-9).

In Mr. Baring-Gould's classification, Davies Gilbert is placed among the 'minor worthies of Cornwall.'* Before challenging that estimate one would like to scan Mr. Baring-Gould's list of the Cornish hierarchy. In the opinion of many Davies Gilbert is entitled to rank with the fifty most eminent men of the West. If contemporary appreciation may be counted a trustworthy guide, his name may even go among the first twenty-five. Mediocrity is not usually associated with the chair of one of the oldest and most learned

* *Cornish Characters and Strange Events*, p. 675.



Davies Gilbert

DAVIES GILBERT, M.A., D.C.L., P.R.S.
First Vice-Patron Royal Cornwall Polytechnic Society.

(1834-9).

societies in Europe, nor are 'minor worthies' the persons selected for high honour by the Universities of Oxford and Cambridge.

Davies Giddy, son of the Rev. Edward Giddy, was born at Tredrea, in the parish of St. Erth, on March 6, 1767. It is recorded of him that he was a child of early intellectual promise, but owing to feeble health he received most of his education at home under skilled tutors, assisted by a father whose learning was of a high order. For about a year he attended the Grammar School at Penzance, his family taking up residence in the town for that purpose. In 1782 he removed with his parents to Bristol, where his studies were carried a stage further; but before that step was taken the youth had met the Rev. Malachi Hitchens, vicar of St. Hilary, who for forty years assisted the Astronomer Royal in the compilation of the 'Nautical Almanack,' and had had his thoughts directed along mathematical lines. On April 12, 1785, he entered as a Gentleman Commoner of Pembroke College, Oxford, and by professors and fellow students alike he was soon regarded as a young man of great promise.

After taking his degree, in 1789, we find him associating with men whose names are now among the landmarks of English history—Dr. Maskelyne, Sir Joseph Banks, Henry Cavendish, Professor Sibthorp, Dr. Withering, John Stackhouse, and others. About this time, also, he became the friend of young Humphry Davy, then a pupil of Dr. Borlase at Penzance, with whom Davies Giddy also took a brief course of medical instruction.

Marrying in 1806* Miss Mary Anne Gilbert, heiress to an estate in Eastbourne, Davies Giddy assumed the name of his wife's family, in pursuance of an injunction contained in a will of her uncle.

Elected a Fellow of the Royal Society in 1791, at the early age of twenty-four, Davies Gilbert was in 1820

* Mr. Baring-Gould (*l.c.*) says 1803.

appointed treasurer, at the same time as his former protégé, Sir Humphry Davy, was elected president. At Sir Humphry's resignation, in 1827, Davies Gilbert was called to the presidential chair, which he filled with great ability until 1831. These two are the only Cornishmen who have been accounted worthy of this great distinction. Davies Gilbert was also a Fellow of the Linnean, Geological, and Royal Astronomical Societies, and of the Society of Antiquaries, president of the Royal Geological Society of Cornwall, and first vice-patron of the Royal Cornwall Polytechnic Society. In 1832 Oxford University made him a D.C.L., while Cambridge conferred an LL.D. Three years after, by a unanimous resolution, he was one of the first three to receive the Royal Cornwall Polytechnic Society's complimentary silver medal, the other recipients being King William IV and a son of James Watt.

He was High Sheriff of Cornwall 1792-3, and from 1804 to 1832 he represented successively Helston and Bodmin in the House of Commons. During his Parliamentary career he was a thoroughgoing supporter of every measure connected with the advancement of science and art, at the same time not forgetting the more domestic interests and claims of his own native county. In the inquiry relating to the currency he was a prominent figure, and in 1811 he published 'A Plain Statement of the Bullion Question.' A year or so later he was chairman of the Bullion Committee of the House of Commons. An offer to him of the position of Under-Secretary of State was declined.

Exactly one hundred years ago Davies Gilbert passed through the Lobby of the House of Commons just as Bellingham, the disappointed office seeker, fired the shot that killed Mr. Spencer Perceval, the Prime Minister.

In 1838 he published a 'Parochial History of Cornwall' in four volumes, founded on the manuscripts of Hals and Tonkin. A valuable treatise on the properties of the

Catenary Curve. and a large number of pamphlets on mining, engineering, and obtruse mathematical problems are among the fruits of his industry and genius. Translations by J. Keigwin and W. Jordan of two Cornish Mystery Plays, which he edited and published in 1826 and 1827, had little or no literary merit, and are now forgotten.

He was the friend of Hornblower in his troubles with Watt, as well as of Trevithick, another unfortunate contemporary engineer. For both he worked a number of ingenious and painstaking calculations. Telford, as is well known, modified his plan of the Menai Straits Bridge, augmenting the interval between the points of support and the roadway by nearly fifty feet, as the result of Davies Gilbert's conclusions on the properties of the Catenary. When London Bridge was found to be inadequate for the increased traffic, and discussions in committee were directed towards replacing it with a wider one, Davies Gilbert, against tremendous opposition, saved the old structure by carrying a motion for widening it by ten feet. One of the greatest compliments paid him was when he was appointed to select the engineer for the construction of Clifton Suspension Bridge. At his suggestion the Observatory at the Cape of Good Hope was founded.

For many years Davies Gilbert applied himself diligently to the study of the native and acclimatized flora of Cornwall, and he was a valued correspondent of most of the leading botanists of his day. His name, associated with Cornish records, often occurs in the third edition of Withering's 'Botanical Arrangement of British Plants.'

He died at Eastbourne on December 24, 1839, at the age of seventy-three. To quote from the Seventh Annual Report of the Royal Cornwall Polytechnic Society: 'The character of his mind was eminently polytechnic; embracing almost every branch of abstract and practical science; richly endowed upon many points, and deficient upon none,

in the vast range of subjects to which he had given his attention. . . . The absence of all envy and petty jealousy, feelings which have cast a cloud over the reputation of many a distinguished philosopher, formed one of the brightest features in his character.'

A bust of Davies Gilbert, presented by his widow in 1847, is in the possession of the Royal Cornwall Polytechnic Society.

Our portrait, showing Davies Gilbert in his study at Eastbourne, is from a lithograph of a painting by Miss E. F. Howarth, in the possession of Mr. J. D. Enys.



SIR RICHARD RAWLINSON VYVYAN, BART., M.P., F.R.S.
First Vice-President of Royal Cornwall Polytechnic Society
(1833—35, 1842—43).

From a portrait by J. Partridge at Trelowarren.



— THE —
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III

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Members wishing to withdraw must pay their Subscriptions for the current year, and signify their intention in writing before the first of January of the year ensuing, or they will be liable for their Subscription for that year also.

Royal Cornwall Polytechnic Society.

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Harvey, Sir Robert, 1, Palace Gate, London, W.	...	10	6
Hodgkin, Thomas, D.C.L., Litt.D., Barmoor Castle, Beal	...	2	2 0
Holloway, George T., M. Inst. M.M., F.I.C., 13, Emmett Street, Limehouse, London	...	10	0
Johnstone, Hugh, 3, Priory Road, Edgbaston, Birmingham	...	10	0
*Layland-Barratt, Sir F., M.A., LL.B., 68, Cadogan Square, London, S.W.	...	1	0 0
Louis, Prof. Henry, M.A., D.Sc., A.R.S.M., M. Inst. C.E., F.I.C., F.G.S., Newcastle-on-Tyne	...	10	0
MacNeill, Bedford, M. Inst. M.M., Assoc. M.I.C.E., F.G.S., 1, London Wall Buildings, London, E.C.	...	10	0

	£	s.	d.
Marks, Sir G. Croydon, M.P., 17, Southampton Buildings, Chancery Lane, E.C. ...	1	1	0
Meyerstein, E. W., 1, Draper's Gardens, Throgmorton St., E.C.	10	0	
Morgan, G. Hay, M.P., 4, Harcourt Buildings, Temple, E.C. ...	1	1	0
*Pearce, Rd., Ph D., F.G.S., 6, Beach Lawn, Waterloo, Liverpool ...	1	1	0
Pease, Miss, St. Michael's Cottage, Leighton Buzzard ...	1	1	0
Reid, Walter F., Fieldside, Addlestone ...	10	0	
Rich, Wm., M.I.M.M., 175, St. James's Court, Buckingham Gate, London ...	1	0	0
Rowe, J. Hambley, M.B., 88, Horton Grange Road, Bradford ...	10	0	
Ruthenburg, M., 98, Leadenhall Street, London ...	10	0	
Steinhoff, Fred., 24, Walbrook. London, E.C. ...	10	0	
Steuart, Douglas S. S., B.Sc., F.R. Met. Soc., F.C.S., F.G.S., 90, Queen Street, London, E.C. ...	10	0	
Sturge, Robert F., F.R. Met. Soc., 101, Pembroke Road, Clifton ...	10	0	
Tangyes, Ltd., Cornwall Works, Birmingham ...	3	3	0
"The Western Morning News Co.," George Street, Plymouth ...	10	0	
Tuckett, F. F., Frenchay, Bristol ...	1	0	0

LIFE MEMBERS.

- Charles Henry Fox, M.D., 35, Heriot Row, Edinburgh.
 Sir T. E. Thorpe, C.B., Ph.D., F.R.S., 61, Ladbroke Grove, London, W.
 Frederic W. Fox, 39, Bank Street, Ashford, Kent.
 Sir Edwin Durning-Lawrence, Bart., 13, Carlton House Terrace, London, S.W.
 Mrs. R. F. Sturge, 101, Pembroke Road, Clifton.
 * Edward Kitto, F.R. Met. Soc., The Observatory, Falmouth.
 H. S. Hill, M.J.I., 29, Staddon Terrace, North Road, Plymouth.
 William Brooks, 10, Richmond Road, Ilford, Essex.
 R. H. Kirton, 22, Broughton Road, Handsworth, Birmingham.

HONORARY MEMBERS.

- Professor W. Grylls Adams, F.R.S., Heathfield, Broadstone, Dorset.
 Sir William H. Preece, K.C.B., F.R.S., 8, Queen Anne's Gate, London, S.W.
 R. H. Scott, M.A., D.Sc., F.R.S., 6, Elm Park Gardens, London, S.W.
 Sir J. W. Swan, M.A., D.Sc., F.R.S., Overhill, Warlingham, Surrey.
 Sir A. W. Rücker, M.A., D.Sc., F.R.S., Everington House, Newbury, Berks.
 * J. H. Collins, F.G.S., Crinnis House, Par Station, Cornwall.

R. T. Glazebrook, C.B., D.Sc., F.R.S., Bushey House, Teddington, Middlesex.
 W. Napier Shaw, M.A., Sc.D., F.R.S., Metl. Office, South Kensington, London,
 S.W.

Professor Arthur Schuster, Ph.D., F.R.A.S., F.R.S., Kent House, Victoria
 Park, Manchester.

Sir Hugh Shakespear Barnes, K.C.S.I., K.C.V.O., 7, Cheyne Place, Chelsea,
 London, S.W.

Capt. Ettrick W. Creak, C.B., R.N., F.R.S., 9, Hervey Road, Blackheath, S.E.
 Charles Cree, D.Sc., LL.D., F.R.S., Kew Observatory, Richmond, Surrey.

Sir J. Norman Lockyer, K.C.B., LL.D., F.R.S., Solar Physics Observatory,
 South Kensington, London.

Sir Archibald Geikie, K.C.B., LL.D., D.Sc., Pres. R.S., Burlington House,
 Piccadilly, London, W.

Hugh Robert Mill, D.Sc., 62, Camden Square, London, N.W.

The Lord Rayleigh, O.M., D.Sc., LL.D., F.R.S., Tereline Place, Witham, Essex,

Sir W. H. M. Christie, K.C.B., D.Sc., F.R.S., Royal Observatory, Greenwich.

Sir Robert S. Ball, LL.D., F.R.S., The Observatory, Cambridge.

Professor H. H. Turner, M.A., D.Sc., F.R.S., University Observatory, Oxford.

Principal E. H. Griffith, M.A., D.Sc., F.R.S., University College, Cardiff.

Professor William Gowland, F.R.S., F.S.A., A.R.S.M., F.I.C., Royal School of
 Mines, South Kensington, London.

John Scott Haldane, M.A., M.D., F.R.S., Lecturer on Physiology, Oxford
 University.

Sir Oliver Lodge, D.Sc., LL.D., F.R.S., Principal of Birmingham University.

Sir Thomas Holland, K.C.I.E., D.Sc., F.G.S., F.R.S., Director of the Geo-
 logical Laboratory at the University of Manchester.

Professor H. Charlton Bastian, M.A., F.R.C.P., F.L.S., F.R.S., Fairfield,
 Chesham Bois.

Sir Henry Alexander Miers, M.A., D.Sc., F.G.S., F.R.S., Principal of the
 University of London.

Sir William Ramsay, K.C.B., Ph.D., D.Sc., F.R.S., Professor of Chemistry at
 University College, London.

W. J. Sollas, M.A., Sc.D., F.G.S., F.R.S., Professor of Geology at Oxford
 University.

Dr. Louis A. Bauer, Director of Terrestrial Magnetism Observatory, Carnegie
 Institute, Washington.

Sir Joseph Larmor, M.A., D.Sc., F.R.S., M.P., St. John's College, Cambridge.

*F. Hamilton Davey, F.L.S., St. Piran, Perranwell Station.

NOTE. *The Secretary will be obliged if the Members will inform him of any
 errors or necessary alterations in these lists.*

The Annual Meeting.

THE Eightieth Annual Meeting of the Royal Cornwall Polytechnic Society was held at the Polytechnic Hall, Falmouth, on Tuesday, 11th February, 1912. In the absence of the President, the Chair was taken by Colonel the Hon. H. W. F.

17a

ERRATUM.

p. 17, line 3 of text, *for* 1912 *read* 1913.

J. F. H. Owen, J. B. Phillips, Charles Phillips, R. N. Rogers, R. Vallentin, Mrs. H. D. Acland, Miss Armstrong, Miss R. Barclay, Mrs. F. J. Bowles, Mrs. L. St. G. Byne, Mrs. W. L. Fox, Mrs. R. Barclay Fox, Mrs. F. F. Hichens, Mrs. Henry Jenner, Mrs. H. H. King, Mrs. Lock, Miss H. E. D. Mills, Miss E. C. Mills, Mrs. Wilfred Rogers, Mrs. W. W. J. Sharpe, and Mrs. J. G. Stephens.

Letters of apology for absence were received from the President (Dr. Thomas Hodgkin), the Lord Bishop of Truro, the Lord St. Levan, Sir Arthur Pendarves Vivian, K.C.B., Colonel Courtenay Vyvyan, C.B., the Rev. H. Holroyd Mills, His Honour Judge Gent, Principal E. H. Griffiths, Miss Burrows, Messrs. Harold B. Carlyon, W. W. J. Sharpe, F. J. Stephens, W. C. Stephens, and R. A. Thomas.

The minutes of the last Annual General Meeting were read and confirmed.

The Annual Meeting.

THE Eightieth Annual Meeting of the Royal Cornwall Polytechnic Society was held at the Polytechnic Hall, Falmouth, on Tuesday, 11th February, 1912. In the absence of the President, the Chair was taken by Colonel the Hon. H. W. F. Trefusis. Among those present were the Lady Mary Trefusis, Sir Edgcumbe Venning, F.R.C.S., the Rev. Canon H. H. King, the Rev. Canon T. Sikes Hichens, the Rev. Canon F. H. Hichens, the Rev. J. S. Burns, Capt. Arthur Rogers, Messrs. H. D. Acland, F.G.S., F. J. Bowles, L. St. G. Byne, F. Chegvidden, Wilson L. Fox, Howard Fox, R. Barclay Fox, C. S. Goldman, M.P., A. Pearse Jenkin, Henry Jenner, F.S.A., Edward Kitto, F.R.Met.Soc., E. J. Moseley (Assistant Secretary), E. W. Newton, F.G.S. (Secretary), J. F. H. Owen, J. B. Phillips, Charles Phillips, R. N. Rogers, R. Vallentin, Mrs. H. D. Acland, Miss Armstrong, Miss R. Barclay, Mrs. F. J. Bowles, Mrs. L. St. G. Byne, Mrs. W. L. Fox, Mrs. R. Barclay Fox, Mrs. F. F. Hichens, Mrs. Henry Jenner, Mrs. H. H. King, Mrs. Lock, Miss H. E. D. Mills, Miss E. C. Mills, Mrs. Wilfred Rogers, Mrs. W. W. J. Sharpe, and Mrs. J. G. Stephens.

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The minutes of the last Annual General Meeting were read and confirmed.

The Report of the Council for 1912 was read by Mr. Jenner.

The Chairman moved the adoption of the Report, and remarked that he could appreciate the really good work done by the Society for the good of the country, and considered the Report more than satisfactory. They had, during the past year, unusual circumstances in catering for the scientific societies who visited the county and were very well satisfied at the reception they were accorded. Proceeding, he remarked, "We must think of the great loss science has incurred through the loss of Capt. Scott and part of his expedition to the South Pole. We have, I believe, their records and that part is not lost to us. But we deplore the loss of these brave and useful men who have died in the cause of science."

The motion was seconded by Mr. R. Vallentin, and adopted.

The Statement of Accounts was presented by the Secretary, who explained that during the past year they had an expensive Exhibition at Falmouth, on which there was a loss of over £100, which was quite expected, and arranged for, and he would like it to be realised that the Society existed for the purpose of spending whatever funds they had in reason in assisting the industries of the county and promoting the technical education of the young. In other directions the expenses had considerably increased. Their rates and taxes had nearly doubled, yet owing to the support the Society was receiving, they had been practically able to carry through the year, on the monies received during that time; part of the balance from the previous year had been placed on deposit, and there was a balance in hand of £49 12s. 2d. at the close of the year.

On the motion of the Chairman the Accounts were passed.

After reading the Meteorological Report, Mr. W. L. Fox stated that the bright sunshine was 1,467 hours or 305 hours below the average for the past 30 years and the lowest by 68 hours recorded during that period. It afforded a striking contrast to most years,

such as 1893, when there were 2,088 hours. The holiday month of August, instead of experiencing an average of 214 hours, had 104 only, being 44 hours less than the previous lowest. In 1912 fifty-five inches of rain fell. This was the largest quantity since 1882, when we had 59 inches, and was 15 inches more than what fell in 1911. August created a record for that month at Falmouth with 10·6 inches, which since 1882 had only once been exceeded in any month, viz., in December, 1896, when there was one-tenth of an inch more. There was room for congratulation, however, when this rainfall was compared with some other localities. Take for instance, Devonshire, where at Lee Moor Shaugh over 80 inches fell, at Sheepstor over 82 inches and 15 in August, and at Two Bridges nearly 107 inches and over 18 in August. The following lines were justified to some extent by the above data :

Dirty days hath September, April, June and November
February is quite all right,
It only rains from noon till night;
All the rest have thirty-one
Without a blessed gleam of sun
And if there had been two and thirty,
They'd have been just as wet and just as dirty.

As a set-off he referred to an extract from the "Western Morning News," of the 8th instant, giving the returns of bright sunshine from thirty stations in the British Isles from the 30th December last to the 1st instant. Falmouth stood at the top with 64 hours, so they must not grumble, particularly when at the foot of the list it was seen that York during the same period had only 8 hours, Glasgow 7 and Manchester 6. All would remember the storm of Boxing Day, 1912. The wind as recorded by the Dines Anemometer at Pendennis Castle reached in gusts a velocity of 98 miles at 8 and 8.30 a.m. and of an estimated rate of over 100 miles at noon and 1 p.m. Between 4.20 and 5 a.m. there was a thunder, lightning and hail storm. One of the flashes was very vivid and was followed almost immediately by a loud clap of thunder. From a paper prepared by Mr. John Henry Barclay

it would appear to be probable that this flash struck a pointed group of rocks at Pennance Point.

The Observatory Committee's report was adopted on the proposition of Mr. W. L. Fox, seconded by Commander Rogers.

Mr. Howard Fox proposed the election of Lord St. Levan as President, and this was seconded by Mr. F. J. Bowles, who alluded to his lordship as a true Cornishman who never failed to do anything he could in the interests of his county. The proposition was unanimously carried.

Mr. H. D. Acland proposed that the following gentlemen be elected Vice-Presidents in the place of those retiring :—Dr. Thomas Hodgkin, D.C.L., Canon T. Sikes Hichens, Captain W. F. Tremayne, Mr. W. C. Stephens.

Mr. C. S. Goldman, M.P., in seconding, said the Society had in the past exercised valuable functions, and he believed it would do so in future to an increasing extent. They realised more and more what science could do, and how necessary it was to support it in every possible way. He referred to the great sorrow felt that one of their great explorers had perished in scientific work, and alluded to the toil and sacrifice they exacted from men who went out on exploration work. We should do more than we had done in regard to science in this country. In regard to meteorological work, for instance, we were a vast maritime nation, and yet spent such a small sum as £16,000. It seemed to him almost beyond comprehension that such a small amount should be spent when there was such a vast field. He hoped they would all unite in securing that the Falmouth Observatory should remain a permanent station for the development of scientific and meteorological work. Modern mining was very different from what it was in former days, and he could not imagine a more fruitful field of development than for any institute to centralize its efforts on that subject. Men went to Germany to study it, but there was no better equipped place for that than Cornwall. On being put to

the meeting this resolution was also carried unanimously.

Mr. F. J. Bowles moved the election of Mr. Henry Jenner as Honorary Editor and Librarian in the place of Mr. F. Hamilton Davey. This was seconded by Canon T. Sykes Hichens.

On the motion of the Rev. Father Burns, seconded by Mr. H. Jenner, Mr. F. Hamilton Davey, of Perranwell, who was described as one of the most distinguished botanists of the country, was elected an honorary member of the Society.

On the resolution of Mr. E. W. Newton seconded by Mr. Wilson L. Fox, the following were elected Members of the Society:—John H. Cordner-James, Past President of the Institution of Mining and Metallurgy, A. G. Charlton, A.R.S.M., Past President Institution of Mining and Metallurgy, G. T. Holloway, M.Inst.M.M., F.G.S., Bedford McNeill, M.Inst.M.M., Assoc.M.Inst.C.E., F.G.S., Prof. Henry Louis, M.A., D.Sc., A.R.S.M., M.Inst.C.E., F.I.G., F.G.S., Paul Dvorkovitz, F.R.C.S., M.R.N. (Russia), Hugh Johnstone, H.M. Inspector of Mines, Walter F. Reid, Past President Society of Chemical Industry, The Right Rev. Winfrid Oldfield Burrows, Lord Bishop of Truro, Thomas Fairley, A. Ernest Thomas, M.Inst.M.M., M.Am.Inst.M.E., Rev. Enys H. Rogers, M.A., His Honour Judge Gent, Mr. J. R. Black, Mrs. J. R. Black and Charles Odgers.

In presenting these names Mr. Newton remarked that ever since its formation, the Society had been particularly fortunate in numbering amongst its members the most distinguished men of Science, Art and Mining that the country produced, and those names now submitted would maintain the reputation and improve the tone of the Society. He was very pleased that several of the members of the scientific party who visited the County in the summer, including several members of the Institution of Mining and Metallurgy, London, the leading Mining Institution of the country, had consented to become members, he felt this was not only a compliment to himself but an honour to the Society, and

they would also be pleased to receive the name of Mr. Enys H. Rogers the successor to their late esteemed friend Mr. J. D. Enys.

He quite agreed with the remarks of Mr. Goldman, and the late Miners' Association of Cornwall and Devon, which had done such a good work in the county, had its origin in this Society, and he believed that the time was ripe to form a Committee to specially deal with mining matters.

The library report was submitted by Mr. Jenner and adopted, on the proposition of Mr. Barclay Fox, who said there were few who could and still fewer who would give the help accorded by Mr. Jenner.—Mr. F. Chegvidden seconded and, alluding to Mr. Hamilton Davy, said that if that gentleman's condition continued to improve as it had during the past few days, they would soon have him amongst them again.

Mr. E. J. Moseley read the Report of the Art Union Committee, which was adopted, and the following names added to that Committee, Messrs. W. W. J. Sharpe, H. B. Carlyon, Cuthbert L. Fox, Capt. A. Rogers.

On the proposition of Mr. R. B. Fox, seconded by Mr. C. S. Goldman, votes of thanks were passed to:—Dr. Thomas Hodgkin, for his Presidential Address at the Exhibition; Mr. Henry Jenner, for his lecture at the Exhibition; The Observatory, Finance and Art Union Committees; Mr. Wilson L. Fox, Hon. Sec. Observatory Committee; The Judges of the Exhibition; Mr. Ewart West and those who assisted in the Concert; Lord St. Levan who acted as Delegate of the Society at the 250th Anniversary Festival of the Royal Society, and to Mr. Wilson L. Fox who represented the Society as Delegate at the British Association Meeting.

A vote of thanks to the Chairman, proposed by the Rev. Canon F. Hichens, and seconded by Mr. H. Jenner was carried unanimously.

Report of the Council for 1912.

THE Royal Cornwall Polytechnic Society has now completed its eightieth year of existence, and it is pleasing to record that during this period by its influence and practical assistance it has been of incalculable benefit to the industries of the County, particularly to mining. In this direction your Society, by the means of its Exhibitions, which enable the mining engineer to be brought into touch with the latest improvements in mining machinery, and new inventions in the treatment of minerals, will continue its usefulness to the mining industry.

In July the County was honoured with a visit from a distinguished party of scientific men, consisting of representatives from most of the leading London Scientific, Engineering and Mining Institutions, and including also members of the Mining and Geological Societies of India and South Africa. For the purposes of receiving and entertaining these gentlemen a County Committee was formed, on which several of your Executive and Council served.

After a very enjoyable and instructive week in which excursions were made to many of the Cornish mines, china clay pits, and engineering works, on the last day of the meeting, Saturday, July 20th, the party visited Falmouth by special steamship from Truro. Several members of your Society joined the party at Truro, and after a very pleasant trip down the Fal, Falmouth was reached at 2.30 p.m. On landing the visitors proceeded to the Polytechnic Hall, where they were received on your behalf by the Mayor, Mr. F. J. Bowles, supported by the

late Mr. John D. Enys, Sir Hender Molesworth St. Aubyn, Messrs. W. L. Fox, R. Barclay Fox, Henry Jenner, Edward Kitto, Horton Bolitho, F. J. Stephens, W. C. Stephens, E. E. Armitage and others.

The Mayor welcomed them to Falmouth, and spoke of the harbour as one of the finest in the country, and the first and last safe harbour in England. The Falmouth people were proud of the natural beauty of their neighbourhood, and of the Polytechnic Society, which has done so much for the County and its industries. If the stay of the visitors was short, they could remedy it by coming again and staying longer.

Mr. Wilson Fox tendered a welcome on behalf of the Society. He alluded to the Busts in their Falmouth Valhalla, especially that of their famous countryman, Sir Humphry Davy. The Society had encouraged mechanical inventions, and Mr. Stephens could tell them how it had helped him in regard to the exhibition of rock-drilling machines. There had been a naval construction department, and there was an art department, a photographic section (which reminded them of the strides made in colour photography) and other departments for the promotion of science, art and industry.

Mr. Edward Kitto also alluded to the educational work of the Society. At Camborne they saw mines and factories; but at Falmouth even a concrete exhibition did not represent the full value of the Society, which was seen in the personal incentive and the developed lives and attainments of the young people, encouraged by their efforts. The Meteorological and Magnetic Observatory was the only one of its kind within 300 miles; it was in his care and doing work of a wide usefulness. He believed that while the visitors gained pleasure, the County would reap benefit from the concentration of some of the best brains in the country upon the resources and industries of Cornwall.

Mr. Ridge thanked all who had welcomed them and entertained them. The Polytechnic Society was the first one of its kind started in the kingdom, and had rendered yeomen service to science and art.

Mr. Hemingway also joined in this expression of thanks, and said they regretted their stay was short among people who had been uniformly kind, and had shown them the utmost geniality and good fellowship. Some of them hoped to see Cornwall again.

Mr. R. Barclay Fox responded and expressed the appreciation of the Society in receiving the scientific visitors, and hoped that their visit to Cornwall would prove of value to all concerned.

The pictures and photographs in the Library and Secretary's Room were inspected with great interest, particularly the portraits of Sir Humphry Davy, Opie, John Taylor, Davies Gilbert, Robert Were Fox, and other members of the Fox family—also those of the former Secretaries of the Society, amongst whom were Mr. Robert Hunt, Sir Clement Le Neve Foster, Mr. J. H. Collins, and Mr. Edward Kitto; specimens of the early work of Burnard, the Cornish sculptor, were much appreciated.

The next item in the programme was a drive around Pendennis Castle, and a visit to the charming gardens of Mr. Howard Fox, where bananas and citrons ripen in the open, and robins and other birds flit from the trees to eat crumbs from Mr. Fox's hands. Mr. and Mrs. Fox welcomed the visitors, and pointed out the rare foreign and tropical plants which have been so perfectly acclimatised.

After Mr. Fox had been suitably thanked for his kindness, the party proceeded to the Gyllyngdune Gardens, where tea was served, thus bringing to a close the week's programme of a meeting, which was acknowledged by all who were privileged to be present to be a great success.

Since your Society was instituted in 1833, seventy-three

exhibitions have been held, of which seventy-one were at Falmouth, one at Camborne, and one at Truro, and at these practically all the important inventions in Machinery, Electricity, Telegraphy, etc., have been exhibited.

This year the Exhibition was held at Falmouth, and your Council, after careful consideration, decided that in view of the rapid strides made in the last few years in electrical invention, particularly in the direction of electrical appliances for household uses, that the special feature of the Exhibition should be "Electrical Machinery and Appliances," and careful attention was given to this section, with the result that it formed one of the best and most interesting electrical exhibitions ever held in the county, and the Judges were particularly pleased with the Bastian heating appliances, in which the incandescent medium employed was quartz tubes. This received the highest award of the Society.

Although the Mechanical Section was not so large as usual, it contained some very interesting exhibits by Messrs. Tangyes, Ltd., Holman Bros., R. Stephens and Sons, Reddaway and Co., and others, all of these being much appreciated. The most interesting object in this section, however, was a copy of the first locomotive made by Wm. Murdoch at Redruth in 1787, which was exhibited and presented to the Society by Mr. George Tangye of Birmingham. Your thanks are specially due to this gentleman for the continued interest taken by him and his kindness to the Polytechnic Society.

The Fine Art Department was of the usual good quality, and most of the leading Cornish artists were represented. You are much indebted to Mr. H. S. Tuke, A.R.A., Mr. J. E. Downing and Mr. J. N. Barlow, who arranged the hanging.

The Natural History Department was again very good—one exhibit of special merit being the fine and unique collection of tin specimens from mid-Cornwall shown by Col. Sir Wm.

Serjeant, C.B., which fully deserved the First Silver Medal awarded. In view of the increased mining activity these collections of Cornish mineral ores correctly labelled and localised are of exceptional value.

Other objects in this section calling for special mention were the collection of gems sent by Mr. W. Griffith, the selection of coloured drawings illustrating the flora of the Falkland Islands by Mrs. Vallentin, and the collection of exotic marine mollusca sent by Mr. Loftus St. G. Byne. The other departments of the Exhibition were of the usual high standard, and included many interesting exhibits.

The Cornwall County Council again sent a collection of the work of their students in the various Art Schools of the County, and it is interesting to record that these exhibits show a marked improvement and advancement from year to year, and the Judges were impressed with the valuable work which the Council is doing in secondary education.

Demonstrations and lectures were given each day in practical Bee-keeping by Mr. J. Cardell Williams.

The Exhibition was opened by your President, Dr. Thomas Hodgkin, in the presence of a distinguished gathering of members and friends, on 27th August. The President in a very interesting address dealt with meteorological observations and the forecasting of weather.

In the evening Mr. Henry Jenner, F.S.A., delivered a lecture on "History in Cornish Place Names" which was highly appreciated. Both this lecture and Dr. Hodgkin's address will appear in the next issue of the Annual Report.

On Wednesday the 28th, a concert was given under the direction of Mr. Ewart West, L.R.A.M., assisted by local vocalists, to whom your thanks are due for an enjoyable evening.

During the week exhibitions of scientific cinematograph pictures were given by the courtesy of Mr. G. S. King, to whom your thanks are also due.

During the year the Polytechnic Hall and premises have been redecorated and all renovations completed, and you will be glad to know that the building throughout is in perfect order and repair.

A number of books have been added to the Library, and many volumes have been bound; the room is open daily for the use of members, and your Council would welcome a more general use of it.

Your thanks are due to Mr. Wilson L. Fox, who again represented the Society as delegate to the Corresponding Societies' Conference at the British Association Meeting held in Dundee.

He reported that the first meeting was held on Thursday, 5th of September, when the chairman, Prof. F. O. Bower, read a very interesting address on the life work of Sir Joseph Hooker (late Hon. Member of the Polytechnic Society.) He indicated the various lines of activity in which he excelled, and contemplated him as a traveller and geographer, a geologist, a morphologist, an administrator, a scientific systematist, and above all as a philosophical biologist. The second meeting was held on Tuesday, 10th September, when a discussion took place on various proposals relative to the management and status of the Conference.

The further consideration of the matter was referred to the Committee. Your delegate advocated the creation of "Plant Reserves" or gardens specially devoted to the preservation of rare plants, ferns, etc., to prevent their extermination in various districts. He gave instances of places which had been denuded of rarities owing to their commercial value. Mr. W. M. Webb read a paper on "Brent Valley Bird Sanctuary," being an experiment in "Bird Protection," which was well received. Mr. A. Newland, of the Inverness Scientific Society and Field Club, opened a discussion on "Water Power and Industrial Development in the Scottish Highlands."

The future of the Falmouth Observatory has engaged the close and unremitting attention of your Observatory Committee during the past year.

Owing to the new Eskdalemuir Meteorological and Magnetic Observatory being in working order, and the consequent discontinuance of the annual grants which had been received since 1902 from the Royal Society and British Association; owing also to the resignation of Mr. Edward Kitto (their valued Superintendent since July, 1882); your Committee in December, 1911, deemed it necessary, though with great reluctance, to give notice to the Meteorological Committee and the Royal Society that they did not see their way to continue the observations after the close of 1912. It was felt, however, that an earnest effort should be made with a view if possible to secure an annual grant that would enable the work of the Observatory to be adjusted so as to meet modern exigencies, especially with reference to the daily weather service and progress in meteorological and magnetical science. An interview was arranged between your President, Dr. Thomas Hodgkin, and the President of the Royal Society, Sir Archibald Geikie, F.R.S., in London (Mr. Kitto being also present). Several distinguished scientists interested in the subject were interviewed. A memorial setting forth the history of the Observatory and a statement of reasons why it should be continued was circulated in the hope of obtaining support for the object named.

In September the Honorary Secretary and Mr. Kitto on your behalf attended the meeting of the British Association at Dundee.

Dr. Shaw, the Honorary Secretary of the British Association Committee on Magnetic Observations at Falmouth (to whom your Committee is greatly indebted for the interest he has taken throughout the negotiations), presented their Report to Section A which, among other things, recommended that in the interests of science Falmouth Observatory might be efficiently maintained.

Section A subsequently adopted unanimously the following resolutions :

1. "That it is desirable that a detailed magnetic survey of the British Isles, on the lines of that of Professors Rucker and Thorpe for the epoch of 1891, should now be repeated, in order to answer the question as to the local variations of the terrestrial magnetic elements within 25 years."
2. "That a representation to this effect be made to the Royal Society, the Admiralty, the Ordnance Department and the Meteorological Committee."
3. "That having regard to the importance of the observations at Falmouth in the work of the previous survey and in other work in connection with terrestrial magnetism and meteorology, steps be taken to assist an appeal for a Treasury Grant in order that the Observatory at Falmouth may be efficiently maintained."

These were communicated to the Committee of Recommendations and accepted by them and the General Committee, by whom they were referred to the Council for consideration and action if desirable. The Council appointed a Committee to report on the matter.

In the meantime the Meteorological Committee agreed to continue their annual grant whilst the appeal for the continued maintenance of the Observatory was unsettled. A formal application was made to the Royal Society, who granted £150 from the Emergency Fund placed by the Government Grant Committee in the hands of the Council, with the hope that this would enable the Royal Cornwall Polytechnic Society to carry on their Observations for six months from the first of January, 1913, in the course of which the results of the efforts being made to establish the Observatory on a more permanent basis might be expected to be known.

The Royal Society celebrated the 250th Anniversary of their Institution on the 15th July last, when your President was honoured with an invitation to be present; he was unfortunately unable to attend. Your thanks are due to Lord St. Levan, Vice-President, who kindly consented to act as the Representative of your Society, and attended on that occasion.

The Council much regret to have to record the loss sustained by the death of the following members:—

January 6th. Richard Davey, a much esteemed member, who took a keen interest in the Society.

February 20th. Sir John G. N. Alleyne, Bart., a distinguished member of the engineering profession, and one of the founders of the Iron and Steel Institute. At your Autumn Meeting in 1903 he gave a valuable address on the changes in the manufacture of Iron and Steel and the development of Engineering Science during the past half century. He was elected a Vice-President in 1904, and presided over the Annual Meetings of 1904 and 1905. The Cornwall County Council appointed him one of their representatives on the Board of Governors of the School of Metalliferous Mining (Cornwall).

March 2nd. Richard Bayly, who was elected a Vice-President in 1903. He gave generous support to the Society's special funds for the erection of the Falmouth Observatory, and for an extended series of experiments in the development of Fish Culture.

May 4th. The Right Rev. Chas. Wm. Stubbs, Lord Bishop of Truro, who joined the Society shortly after he came to Truro, and was elected a Vice-President in 1908. A man of high attainment, ripe scholarship and kindly disposition, he endeared himself to all those with whom he came in contact.

November 7th. John Davies Enys, President 1907 to 1909, and one of the Society's most steadfast and valued friends, whose

family has been connected with your Society from its inception. He possessed an encyclopedic knowledge of the history, products, and interests of his native county, its antiquities, churches and county families. He was an authority on horticulture, and the many semi-tropical exotics which flourished in his garden, in which he took loving interest, made Enys a place of delight. His death is a loss to the County at large.

November 14th. William Town was a member of the Council, and interested himself in the work of the Society during the years he spent at Falmouth.

Your esteemed President, Dr. Thomas Hodgkin, retires to-day on the expiration of his term of office. You are all aware of the faithful and brilliant manner in which he has carried out the duties of that office, which has in the past been held by many distinguished men. His addresses and lectures have added much to the value of your reports in which they have appeared.

Your Council unanimously recommend to you the name of the Right Hon. Lord St. Levan as your President for the next three years, well knowing that this name will commend itself to you, and, from the deep interest his Lordship has taken in the welfare of your Society since he became a member, that he will prove a worthy successor to those who have so ably filled this office in the past, amongst whom was his esteemed father, who in 1868 was elected to succeed Sir Charles Lemon, the first President of the Society.

It will also be your duty to elect four Vice Presidents in the room of Lord St. Levan, Sir George J. Smith, Harold B. Carlyon, M.A., and James Wickett, who retire by rotation, and your Council recommend the following gentlemen for election:—T. Hodgkin, D.C.L., Litt.D., Capt. W. F. Tremayne, Canon T. Sikes Hichens, W. C. Stephens.

You will regret to hear that owing to the complete breakdown of his health Mr. F. Hamilton Davey, F. L.S., your Editor and

Hon. Librarian, has been compelled to resign these offices, the duties of which he has most ably carried out for many years, and for which your thanks are specially due to him, as well as for the active interest he has always taken in the welfare of the Society.

Your Council has great pleasure in submitting the name of Mr. Henry Jenner, F.S.A., for election to these offices; feeling assured that in his hands the duties will be well carried out.

The following name is recommended for election as an Honorary Member of the Society :—F. Hamilton Davey, F.L.S.

Although during the year the expenses of the Society have materially increased in several directions, the financial position is sound, and from the Statement of Accounts which will be presented, you will see that the year closes with a small balance in hand.



The Librarian's Report.

THE past year has not been a very eventful one in the history of the Library, except in one particular. The arrangement and classification of the books, to which allusion was made in the last report, have merely been continued, and the additions to the library have been chiefly continuations of series already begun. Only one event of importance has occurred. The Society has to lament the loss of the services as Honorary Librarian of our distinguished friend, Mr. F. Hamilton Davey, whose serious illness has compelled him to give up all work, including that which he has performed so efficiently in connection with this library. All who know him will deeply regret this on personal no less than on public grounds.

Several valuable donations and purchases have been received during the year, a list of which will appear in the Annual Report. Among them may be specially noted the following:—

“The West of England Mining Region,” by J. H. Collins.

“Life and Letters of Herbert Spencer,” presented by the Herbert Spencer Trustees.

The continuations of the Quarterly Journal of the Geological Society, and the Transactions of the Institute of Mining Engineers have been, as before, deposited in the Library by Mr. F. J. Stephens.

The British Museum has presented the second volume of “Index to Charters and Rolls,” and the British Museum (Natural History) has continued to give volumes and parts of its separate and special catalogues. Among these is included a very interesting popular Guide to Bible Animals, Plants and Minerals which has recently been issued.

The Royal Society has presented, besides its usual Year Books and Proceedings, two special publications connected with its 250th anniversary celebrations, "Record of the Royal Society of London," and "Signatures in the first Journal and Charter Books."

The usual binding of paper parts of transactions, etc. has been carried on during the year, and will no doubt continue. There are some cases which might have special treatment, and among them might be the valuable quarto series of the Smithsonian Institute, entitled "Contributions to Knowledge," of which the set in this Library is nearly complete. It is only in paper covers and is getting a good deal the worse for standing on the shelves in that condition.

The Library, though not large, is really a very good one of its sort. It is richest in reports and transactions of learned societies and official scientific reports. In this respect it might be easy to make many additions. Thus, for example, the Agents of Colonies might be approached, with the object of obtaining from them more complete series of their respective departmental reports (often very valuable) on matters within the scope of the Society. If the work and status of the Society were properly represented to them, they would no doubt see that the Library was worth encouraging. The British Museum has been very generous in the past. Such gifts as the facsimile of the Ani Papyrus, and Mr. Grueber's work on Historical Medals are really munificent presents, and it is quite possible that even more may be done in the future.

Hitherto the Society has trusted chiefly to donations and exchanges, and purchases of books have not been numerous. There is a suggestion that a certain sum should be annually devoted to buying books. As it cannot be a large sum, it is important that it should be judiciously applied. There are in the Society many specialists on various subjects. Suggestions

from these would be very acceptable, especially if they will remember in making them that the money and space of the Society are both limited, and that therefore the purchases must necessarily be of books of permanent value, rather than of those of transient and ephemeral interest.

And in this connection it may be well to point out that the presses in the Library itself are all filled up, and that there has been something of an overflow into a rather inconvenient cupboard in the "ante-room" at the back of the stage in the hall. This shows that more presses are needed. Probably the best space to utilize for this purpose would be this ante-room. There would be no difficulty in fitting up a press at a time, as it was wanted. As the room is used as a cloak-room when entertainments are given in the room above, it would be necessary to cover the presses with wire lattices, as in the present Library.

It is perhaps strange that so good a Library is so little used by Members of the Society, and it may be well to remind them that it is open daily from 9 a.m. to 7 p.m., and that while the cinematographic shows are going on in the hall, the caretaker is always to be found at the ticket office, so that it is possible also to use the Library in the evening. Moreover, books can be borrowed under not very hard conditions.

List of Additions to the Library.

GOVERNMENT AND OFFICIAL :—

Australian Museum : Records, vol. viii, no. 3 ; vol. ix, no. 1.

Board of Agriculture : Journal, 1912.

British Museum : Index to Charters and Rolls, vol. 2.

British Museum of Natural History :

Catalogue of Lepidoptera phalaenæ, vol. 11 (text and plates).

„ „ Mycetozoa.

„ „ Chiroptera, vol. 1.

„ „ Ichneumonidæ, pt. 1.

„ „ Bible Animals, Plants and Minerals.

Canadian Department of Mines :

Annual Report, 1910.

Summary Report, 1911.

Bulletin No. 6, Diamond Drilling (Ontario).

Bulletin No. 7, Torbrook Iron Deposits.

Coals of Canada, vols. 1 and 2.

Catalogue of Publications, 1907-11.

Mica (Publication No. 118).

Peat Fuel (Publication No. 154).

Canadian Geological Survey :

Summary Report for 1911.

Memoir No. 13. Southern Vancouver Island.

„ „ 14. New Species of Shells, Vancouver Is.

„ „ 15. Trenton Echinoderm Fauna, Kirkfield, Ont.

„ „ 21. Geology of Phoenix, Brit. Col.

„ „ 24. Clays and Shales of Western Provinces.

„ „ 27. Turtle Mountain, Alberta.

„ „ 28. Steep Rock Lake, Ontario.

Cape of Good Hope: Department of Mines:

15th Annual Report of the Geological Commission, 1910.

Two maps.

Department of Agriculture for Ireland:

Report on Sea and Inland fisheries of Ireland for 1911.

Queensland Museum: Annals, No. 10.

SOCIETIES:—

Ashmolean Natural History Society of Oxfordshire: Proceedings and Report for 1911.

Bristol Naturalists' Society: Proceedings, vol. ii, part 3 and contents; vol. iii, part 1.

Chemical Society: Proceedings, part of vol. xxvii.

Deronshire Association: Report, vol. xliii; extra vol., Calendar of Wills, part 11.

Geological Society of London: Abstracts of Proceedings, Nos. 913-928, 1911-12.

Institution of Mechanical Engineers: Proceedings, 1911, No. 4; 1912, Nos. 1 and 2; Index, 1901-10.

Institution of Mining and Metallurgy: Bulletins to date; Transactions, vol. xxi.

Junior Institution of Engineers: Journal and Transactions, vol. xxi, 1910-11.

Literary and Philosophical Society of Liverpool: Proceedings, No. 62; index volume to Nos. 1-62.

London and West Country Chamber of Mines: Records, vol. iii, part 2.

Manchester Literary and Philosophical Society: Memoirs and Proceedings, vol. lvi, parts 1, 2, 3.

Mining and Geological Institute of India: List of Members, 1912. Transactions, vol. vi, part 4, and index; vol. vii, part i.

North of England Institute of Mining and Mechanical Engineers: Transactions, vol. lix, part 9 (index); vol. lxi, part 8; vol. lxii, parts 1 to 7.

Photographic Journal: vol. lii (1912).

Reading Literary and Scientific Society: Report and Proceedings for 1911-12.

Royal Dublin Society: Scientific Proceedings, vol. xiii, Nos. 24, 25, 26; Economic Proceedings, vol. ii, No. 5.

Royal Geological Society of Cornwall: 98th Annual Report.

Royal Institution of Great Britain: Proceedings, No. 104.

Royal Irish Academy: Proceedings, vol. xxix, Series A, Nos. 5, 6, 9; Series B, Nos. 7, 8, 9. Vol. xxx, Series A, Nos. 1, 2, 3, 4; Series B, Nos. 1, 2; Series C, Nos. 1 to 11. Vol. xxxi, Clare Island Survey, Nos. 2, 11, 12, 13, 15 to 19, 20, 23, 26 to 31, 40, 41, 43, 44, 46, 53, 56 to 60, 63.

Royal Society: Year Book for 1912. Proceedings: Series A, vol. lxxxvi, Nos. 584-591; vol. lxxxvii, Nos. 592 to 598. Series A, vol. lxxxiv, No. 575; vol. lxxxv, Nos. 576 to 583. Record of the Royal Society of London, 1912. Signatures in the first Journal and Charter books.

Royal Meteorological Committee: Report for 1911-12.

Royal Philosophical Society of Glasgow: Proceedings, vols. xlii and xliii.

Royal Society of Arts: Journal for 1912.

South Wales Institute of Engineers: Proceedings, vol. xxvii, parts 7 and 8; vol. xxviii, parts 1, 2, 3, 4. List of Members, 1911.

AMERICAN AND COLONIAL:—

American Geographical Society: Bulletins, vol. xliii, Nos. 1-12, 1912.

American Historical Association: Annual Report, 1910.

American Philosophical Society: Proceedings, Nos. 202 to 206. Transactions, vol. xxii, part 2. List of Members, 1912.

Carnegie Institute of Washington: Descriptive Pamphlet, Department of Terrestrial Magnetism: Report for 1911, and five Pamphlets on Magnetic Researches.

- Chicago Academy of Sciences*: Bulletin, vol. iii, Nos. 4 and 5.
Special publication, No. 3. Lymneidæ of North and Middle America.
- New York Academy of Sciences*: Annals, vol. xxi, pp. 87-263;
vol. xxii, pp. 1-160.
- Nora Scotian Institute of Science*: Proceeding, vol. xii, part 3;
vol. xiii, parts 1 and 2.
- Royal Astronomical Society of Canada*: Journal, vol. vi, parts 1
and 2.
- Smithsonian Institution*: Miscellaneous Collection, vol. lvi, Nos.
23 to 37 and index; vol. lvii, Nos. 6 to 10; vol. lviii,
No. 2; vol. lix, Nos. 2, 4, 5, 8, 11, 14 to 18, 20; vol. lx,
Nos. 1 to 14.
- Toronto University*: Studies in History and Economics, vols. 1,
2 and 3 (No. 1).
- Tufts College*: Studies, vol. iii, No. 2.
- United States Department of Agriculture*: Year Book for 1911.
- United States Geological Survey*: 32nd Annual Report (1911).
Bulletins, Nos. 448, 467-7, 470-4-8, 483-4, 486 to 489,
490-1-3-5-8, 504 to 508, 511, 512, 516, 517. Geologic
folios, Nos. 174 to 182. Mineral Resources, 1910 (2
parts). Monographs, No. 52. Professional Papers, Nos.
69, 73, 74, 75. Water Supply Papers, Nos. 261, 269,
271, 272, 278, 286, 287, 288.
- United States National Herbarium*: Contributions:—vol. xiii,
part 2 and index; vol. xiv, part 3 and index; vol. xvi,
parts 1, 2, 3.
- United States National Museum*: Bulletins, Nos. 50 and 77;
Proceedings, vol. xl and xli; Annual Report, 1911.
- MISCELLANEOUS:—
West of England Mining Region, by J. H. Collins
Life and Letters of Herbert Spencer, by David Duncan.
Presented by the Herbert Spencer Trustees.

Quarterly Journal of the Geological Society of London, for
1912. Transactions of Institution of Mining Engineers
for 1912. Lent by Mr. F. J. Stephens.



Hon. Treasurer in Account with the Royal Cornwall Polytechnic Society.

DR.

1912

CR.

	£ s. d.		£ s. d.
To amount on Deposit, No. 1 Account ..	£50 0 0	By Salaries	107 12 0
" " " No. 2 ..	900 0 0	" Hallkeeper's wages ..	31 0 0
" " Renovation ..	64 0 11	" Gas, Electric Light, Coal, etc. ..	22 19 10
	<hr/> 414 0 11	" Rates, Taxes, and Insurances ..	58 3 6
" Balance in Capital & Counties Bank, Falmouth ..	103 5 5	" Travelling Expenses ..	31 0 7
" " Secretary's hands ..	4 17 0	" Repairs and Renewals to Premises ..	77 9
	<hr/> 108 2 5	" Postages, Telegrams, and Railway Carriages	24 4 0
" Rent of Hall and Light ..	246 9 4	" Printing and Stationery, General ..	46 13 8
" Rent Falmouth Subscription Library ..	5 0 0	" Annual Report ..	21 17 7
" Acknowledgment Rents ..	2 0		<hr/> 68 11 3
" Interest on Deposit Accounts ..	12 0 1	" Labour	82 2 9
" Donation from H.R.H. Prince of Wales ..	5 0 0	" Refreshments, Judges' Luncheons, etc. ..	12 6 5
" Members' Subscriptions ..	151 12 0	" Materials	48 18 6
" " Arrears ..	21 19 6	" Contribution to Devon Association ..	1 1 0
	<hr/> 173 11 6	" Meeting .. " Joint Scientific ..	5 0 0
" Admissions to Exhibition ..	39 19 0	" Bookbinding	5 16 6
" Sale of Catalogues ..	4 12 2	" Advertising	15 3 9
" Advertisements in Catalogue ..	18 8 0	" Entertainments	3 0 0
" Exhibition entry fees ..	51 10 0	" Billposting	5 13 6
" Cornwall Education Committee, Diplomas ..	1 15 0	" Legal Expenses	1 1 6
" Sale of Report	5 0	" Prizes paid in Cash	5 10 0
" Picture sold in Exhibition ..	1 10 0	" " " Medals	13 7 6
" Contribution towards painting, G. S. King	5 10 0	" Picture	1 8 6
" Outstanding Cheques ..	51 16 2	" Hire of Library room	7 6
		" Acknowledgment Rents	5 6
		" Compensation, Damage to Exhibits ..	1 19 8
		" Police during Exhibition	1 15 0
		" Transferred to Deposit Account ..	100 0 0
		" Deposit Account No. 1 Miss Fox's Legacy ..	50 0 0
		" Deposit Account No. 2 ..	250 0 0
		" Special Renovation Account ..	64 0 11
			<hr/> 464 0 11
		" Balance in Capital & Counties Bank, Falmouth ..	49 12 2
	<hr/> <hr/> £1139 11 7		<hr/> <hr/> £1139 11 7

Examined with Vouchers and found correct.

F. J. BOWLES,
HAROLD B. CARLYON, } Audit Committee.
W. W. J. SHARPE,

30th January, 1913.

Report of the Art Union Committee.

The Committee beg to report that the Drawing in connection with the Exhibition took place at the Hall, on Friday, 30th August, 1912.

The following is a Statement of Account as presented at the Annual Meeting on Sept. 12th, 1912.

	£	s.	d.
Balance from 1910	9	11	9
499 tickets sold ...	24	19	0
Com. from Artists	1	12	9
" " Prize			
Winners ...	15	0	
Extra paid by Prize			
Winners ...	3	7	0
	<hr/>		
	£10	5	6
	<hr/>		

The Committee recommend that 4 members be added to the Committee to fill the vacancies caused through deaths and resignations.

The following were added to the Committee:—Messrs. W. W. J. Sharpe, H. B. Carlyon, Cuthbert L. Fox, Capt. A. Rogers.

The Seventy-Third Exhibition.

THE Seventy-third Exhibition of the Royal Cornwall Polytechnic Society was held at the Polytechnic Hall, Falmouth, from the 27th to the 31st August, 1912.

As the special feature of this Exhibition was Electricity, most of the space on the ground floor of the hall was reserved for objects connected therewith, and as a result a very comprehensive display of Electrical Machinery and Appliances, sent by a considerable number of exhibitors, was produced.

The Mechanical Section included objects of special interest sent by Messrs. Tangye, Limited, Reddaway and Co., R. Stephens and Son, and others.

The gallery, as usual, was devoted to an exhibition of pictures in oil and water-colour, to which many of the leading artists of Cornwall contributed.

The Natural History Section was unusually good. Among the more interesting objects in this section may be mentioned the fine collection of Cassiterite specimens from Mid Cornwall exhibited by Col. Sir William Sergeant, and the sketches illustrating the flora of the Falkland Islands by Mrs. Rupert Vallentin.

The large Committee Room was completely filled with the collection exhibited by the Cornwall County Council, illustrating the work done by the students of the various Art Schools throughout the county.

THE OPENING CEREMONY.

At mid-day on 27th August, the Exhibition was formally opened by the President, Dr. Thomas Hodgkin, who was supported on the platform by Lord St. Levan, Lady Margaret Boscawen, Colonel Faulkner Brown, Colonel Sir William Sergeant, Capt.

Arthur Rogers, Messrs. E. B. Beauchamp, F. J. Bowles (Mayor of Falmouth), J. H. Collins, Wilson L. Fox, C. S. Goldman, M.P., Henry Jenner, Edward Kitto, E. W. Newton, G. F. Thomas Peter, and others.

The President's inaugural address on "The Weather," a subject of some interest during the summer of 1912, was listened to with great attention. The full text of it will appear elsewhere in this Report.

Mr. E. W. Newton, the Secretary, reported very fully on the objects exhibited. It was six years since the Exhibition had been held at Falmouth, and he thought that they would all agree that although this Exhibition was not so large as on the two previous occasions, it was equally interesting, and the exhibits generally were equal to anything that had been shown at any Polytechnic Exhibition in Falmouth. Perhaps the most interesting exhibit was the model of the first locomotive, and incidentally of the first motor car ever known. This was made by Wm. Murdoch in 1787, quite 20 or 30 years before Trevithick made his first engine. Murdock at that time lived at Fish Cross, Redruth, and was an exceptionally clever engineer. He was the Cornish representative of the firm of Boulton and Watt, the great engineers, and most of the improvements in the Cornish pumping engine were due to his skill and genius. This year they had made a special feature of electricity and its application to household requirements. The flexibility of electricity was remarkable. He alluded to some of its uses, remarking upon the demonstrations that could be seen in the Exhibition. A very interesting electrical mining pump was exhibited by Haslam and Schontheil. The natural history section was exceptionally good. Perhaps the most valuable exhibit to the county would be the splendid collection of Tin specimens exhibited by Col. Sir Wm. Sergeant, as they were a specialised collection of a portion of the county, viz., Mid-Cornwall. It contained specimens of metallic tin smelted either by the Phœnicians or the

Romans considerably over 1,000 years ago. These specimens had remained buried so long that the oxide of tin was beginning to deposit on the surface. The alluvial tins from Redmoor were specially interesting, and an exhibition of that kind was bound to appeal to all connected with the mining industry. The collection of reconstructed gems was certainly unique from many points of view, especially the scientific side, as showing the marvellous strides science had made in dealing with gems. Several years ago some of them would remember that attempts were made at Niagara, where it was possible to obtain immense power for generating heat, to manufacture artificial gems. The effort was a failure, but incidentally a discovery valuable to the industrial world was made in the invention of Carborundum, which proved much superior to the Emery of ordinary commerce. Further experiments, however, were made in the direction of improving precious stones by means of intense heat, which reached 3,500 degrees centigrade. Of course it was known that for every perfect ruby discovered, for example, at least five hundred were imperfect, either by flaws or by the colour being too light or too dark. As a result of these experiments it was now possible to re-melt the stones in an electric arc, and after being polished they were to all intents and purposes as good as the natural stones and by judicious blending of the colours of the imperfect stones gems of great beauty were obtained, a number of which were on view in the Exhibition. Until recently it was impossible to deal with sapphires, but now they could be successfully treated, and those exhibited were exceptionally beautiful. The reconstructed pearls were first turned to shape, and then coated with a solution of pearl in exactly the same manner as nature did through the oyster. The result was that a pearl necklace of this description which could be sold for £4 or £5 was almost equal in appearance to one of the natural pearls costing £2,000. Some of the pearls in the cases were of the natural form, and others shewed the improve-

ments science had effected. Formerly again the white sapphire was of little value because it had no life, but after being remelted and cut it was almost as brilliant as a diamond, so that it was sometimes difficult to distinguish one from the other. It was very interesting to note that many colourless gems and other transparent minerals are changed in colour, becoming darker, by being subjected to the emanations of radium for some time, and Mr. Arthur Schiff, of the St. Ives Radium Mines, had sent some examples of Nigerian white topazes which had been altered in colour to some beautiful shades of orange and brown by this treatment. It was interesting to note that the distinguished Cornishman, Dr. Richard Pearce, some forty years ago called attention to the fact that he had found stones of Fluor Spar in Dolcoath Mine which appeared to have changed in colour from some emanation from neighbouring matter, and were found in association with the mineral Pitchblende. Consequently he anticipated these discoveries of more modern days. Another exhibit worthy of notice was that of Messrs. Redaway, Manchester, which included a broad indiarubber belt, strengthened with canvas, for use in the Frue Vanner, which was so largely used in the Cornish mines. Mr. Newton also referred to the interesting electrical apparatus, which included every form of household appliance. In the ornamental art classes there was a very fine example of wrought iron work done by a working man, for which the judges awarded a first class silver medal.

Lord St. Levan, proposing a vote of thanks to the President, said he had hoped he might have been able to have brought an exhibit there that day. He tried hard, but did not succeed. He did not know what was the relative position of the sun, and the moon, and the planets in 1785, but in that year there was a great influx of great white Indian sharks in the Channel and particularly in Mount's Bay. This year exactly the same thing had happened, and he had had the opportunity in the last two days of

seeing those unwelcome strangers. He had been close to them, and could have almost touched them. On the previous day he saw within a few miles of shore, and in one case within a mile of the shore, six sharks twenty to thirty feet in length, and of corresponding bulk. If he had only succeeded in catching one, what a fine thing it would have been to have brought it to that exhibition. He should like to know if anybody had ever seen a shark of that size caught in these waters. It would be interesting to know what had been the cause of their presence there. He did not know whether the sun, moon, and planets had anything to do with it.

Mr. C. S. Goldman, M.P. seconded, and said Dr. Hodgkin had thrown out an idea which he hoped would be responded to in the country. Generally speaking, wherever they went, if something was wrong it was not the individual who was made responsible, but some collective organization, and even in that community he had heard the Government blamed for the meteorological conditions. However, he did attach a great deal of responsibility to the Government, who, he considered, should do far more for scientific research than they did. He would only ask them to cast their eyes across the water for a few moments and see what other countries were doing in respect of science. In Germany there were Universities all over the country subsidised by the Government. Compare that attitude to the attitude of the Government of this country. If they only took the one subject of tropical research, they saw how early Germany, who had no tropical possessions, and how much later England, came into the field. Remembering how great a maritime nation they were, he hoped the Government would see its way clear to subsidise and help scientific research of such importance as that referred to in a more practical and more demonstrative manner than they had done in the past. Referring to more accurate forecasts of the weather, Mr. Goldman suggested it might be to

nature they would have to look for them. He had been told that wasps were about and that they were indicative of an alteration in the weather. If that were so, nature in the beginning denoted a change of conditions, and he did not know how far they might look to nature in the future to solve some of those difficulties. Mr. Goldman expressed gratification that not only had England taken a pioneer attitude in radio-telegraphy, but she was far in advance of other nations. That brought them to the subject of waves and air currents, and seeing that aeroplanes were likely to play so great a part in future locomotion the whole question was likely to assume a far more important consideration than it had received in the past. The Polytechnic Society had done and was doing a great deal, and there was more still to be done in Cornwall from a mining point of view. Cornwall had been a great mining inventor. For instance, they were aware how essential it was they should get a new rock drill, and above all a hand rock drill. Did they move in this country? No, they left it to the Transvaal to come forward and hold out a great prize to anyone who would invent a portable hand drill. Thanks to the inventive genius of the men of Cornwall, the prize fell to Messrs. Holman Bros. In further evidence of the inventive efforts of some of their people in Cornwall, he had received a letter notifying him of the discovery of perpetual motion, which would be brought about by the agency of the tides, and the writer stated he would soon be able to give a practical demonstration. Another person had brought to his notice a two-bladed propeller, whilst a Falmouth gentleman had produced a new and improved rock drill, which might have a future. These signs made him hopeful. The county had a wonderful mining industry, and with up-to-date machinery to deal with some of the refractory ores, it would be made a great mining centre.

Mr. Beauchamp and Mr. Collins supported, and the vote was received with acclamation.

In the evening of the same day Mr. Henry Jenner gave a lecture on "History in Cornish Place-names," the full text of which will appear elsewhere in this Report.

On Wednesday, 28th August, a Concert in connection with the Exhibition was given at the Polytechnic Hall. The programme was arranged by Mr. Ewart West, L.R.A.M., A.R.C.M., organist of the Parish Church of King Charles the Martyr, Falmouth. Among the performers were Miss I. Ellis, whose songs were much appreciated, Miss Cooper, Miss M. Hoskins, Mrs. D. Harris, Mrs. Daukes, Mrs. Fisher, Mr. C. Brimacombe, Mr. G. Rogers, Mr. A. Nelson-Walker, and others.

On the 29th and 31st August, by permission of Mr. G. S. King, lessee of the Polytechnic Picture Hall, an exhibition of scientific kinematograph pictures was given. The pictures depicted the artificial breeding of trout and salmon, submarine fauna, the larva of the dragon fly, liquid air, and a number of other subjects.



Reports and Awards.

MECHANICS.

JUDGES :—*Messrs. N. Trestrail, L. A. Hards, W. Teague, Joseph Jennings.*

The Judges reported :—

For the Tangye Improved Oil Engine, they have awarded a Diploma of Honour. They much appreciate the engine at work for the very easy and effective manner in which it runs, and they consider that the admission of water to the ignition chamber is likely to prove a useful addition to this type of engine.

To Messrs. Bickford, Smith and Co. for their new system of blasting, they have awarded a Diploma of Honour. They consider that this important detonating fuse consisting of a lead tube filled with trinitrotoluene by the very safe manner in which it can be handled, and the fact that the detonator is placed outside of the hole and is capable of firing a number of shots at one time, ensures much greater security in blasting or shot firing in all cases.

To Messrs. F. Reddaway and Co. they have awarded a Diploma of Honour for their complete stand, and also a First Silver Medal for their Rubber Vanner Belt. They are pleased to note that for the first time this type of belt has been produced in England, and further, that the belt is of much greater strength and better quality than those hitherto used. They highly commend the firm for their latest production in canvas fire hose, which is circular woven instead of flat, thus being capable of standing abnormal pressure.

To Messrs. R. Stephens and Son a First Silver Medal has been awarded for their new Climax Hand Hammer Drill, which they consider a very valuable improvement in this type of machine.

The stand of Messrs. E. T. Newton and Son, Ltd., comprises various types of surveying instruments of special design for

various mining purposes, and they much appreciate the high-class workmanship of all the work in the stand, and specially mention the model of the first locomotive constructed by William Murdoch in 1787, which has been presented to the Society by Mr. George Tangye and made by this firm, and have awarded a diploma of honour for the exhibits generally.

To Mr. F. Rashleigh's improved ladder base a second bronze medal is awarded.

To the Westminster Engineering Company for their projection arc lamp, which they consider to be good, useful, and neat in many ways, they also award a second bronze medal.

Mr. J. V. Moinet exhibits a beautifully made model of a London and North Western locomotive, and the judges are pleased with the workmanship and award him a first bronze medal.

To Mr. G. F. W. Trestrail for his model showing depth of water in a mine they have awarded a second silver medal, and appreciate his novel and valuable method, and clearly see its great usefulness in demonstrating the position of water in unwatering mines to the novice, and also to mark important positions, even after the same has been unwatered.

The surveying plan of Mr. C. E. Jordan shows good work. The notes are neat and clear, and executed with precision, and they award for this exhibit a first class bronze medal.

They also award a first class bronze medal to Mr. W. H. Veal for his plans, which are interesting and executed with great care. The precision of these plans discloses general ability.

To Mr. H. F. Trew for his design of a church they award a certificate of merit, and consider it an interesting exhibit and full of detail from many points of view.

To Messrs. Haslam and Schontheil they award a first silver medal for their roto-plunge pump, and consider it a very interesting and useful exhibit, and likely to prove of considerable value for mining purposes. They further highly commend the

stand generally, particularly mentioning the exhibit of the float electric lamps.

To Mr. J. Blight, Jun., for general exhibit of electrical appliances, they award a diploma of merit, and to Messrs. J. H. Deeble and Son for the cooking apparatus, electric hair dryer and vacuum cleaner, they give a similar award.

The judges were much interested in the Bastian heating apparatus, and particularly the application of quartz in its construction, as this material is capable of standing a very high temperature when applied to electrical apparatus. They are pleased to award to the London Electrical Trading Co., for this invention, a first silver medal.

For the exhibit of arrangement of switch gear, or the control of duplicate electric mains, designed and made by the Cornwall Electric Power Co., they award a first silver medal.

To the Electric Supply Corporation, Falmouth, the judges expressed their commendation of the usefulness of the exhibits on this stand.

The judges consider the apparatus exhibited by Messrs. Price, Pryse & Co., for exploding holes, to be a step in the right direction, and would welcome a practical illustration, which they desire to encourage in every way. It was awarded a diploma of merit.

The judges appreciate the value of the educational system of the International Correspondence Schools, Limited, and are pleased to award this valuable institution a first bronze medal.

ESSAYS AND SCIENTIFIC PAPERS.

JUDGES:—*Messrs. F. J. Stephens, J. H. Collins, J. Gill, and H. Jenner.*

The judges reported that the papers were carefully written and well thought out. Award: 2nd bronze medal, F. Jackett, for essays on ventilation and sanitation.

NATURAL HISTORY.

JUDGES:—*Messrs. R. Vallentin, H. Fox, Jas. Wickett, and G. H. Fox.*

The judges remarked that the objects sent in were of exceptional merit. Mr. Loftus Byne, a new competitor, was awarded a first bronze medal for a large and varied selection of exotic marine shells. The judges expressed the hope that he would devote his attention to Cornish shells, and that at the next exhibition a representative collection made by him would be sent. Mrs. Vallentin contributed a collection of coloured drawings of living plants from over 400 illustrations made during a recent visit to the Falkland Islands, South America. The drawings sent for exhibition were excellent. All the ferns, and especially the wild raspberry of those climes, are of unusual interest. The judges wished to direct special attention to the careful and accurate drawings of the minute microscopical dissections of the parts of flowers made from living specimens. As Mrs. Vallentin had already received the highest award in this department, the judges could bestow no further one. Miss M. C. Crozier sent a very instructive exhibit illustrating the development stages of the common frog from an egg. She also sent a representative collection of well-dried and mounted plants, gathered near Stirling. For these exhibits she was awarded a first silver medal. To Miss F. J. Crozier a first bronze medal was awarded for her paper on the structure of plants, illustrated by careful drawings. To Colonel Sir William Serjeant a first silver medal was awarded for a most complete collection of alluvial and other cassiterites from Mid-Cornwall. The judges considered this the most perfect collection of tin ore ever exhibited at the Polytechnic. A diploma of honour was awarded Mr. W. Griffiths for his magnificent collection of precious stones. Many of these had been artificially produced by subjecting imperfect jewels to great heat by electricity, and thereby producing many gems equal, if not superior, to the natural ones.

AMATEUR FINE ART.

JUDGES :—*Messrs. J. E. Downing, J. N. Barlow, L. A. Pownall, and H. S. Tuke, A.R.A.*

The judges remarked that the entries were very limited, one bronze medal only being awarded. They considered that unless this department showed marked improvement in future the awards offered should be withdrawn. The bronze medal went to Harold F. Trew for a water-colour landscape, and a monetary award was made to Enid Rich for a very careful outline study of six flowers, while Fredk. Tuckers's still-life studies received honourable mention. As regarded the Pool County School, the judges were pleased to see the effort made by the children under 14 years of age. The studies in coloured chalk showed considerable talent, and diplomas were given to V. Pearce, C. Williams, W. Boulden, F. Andrew, and N. Reynolds.

PHOTOGRAPHY.

JUDGES —*Messrs. E. Kutto, G. E. Lanyon, and H. W. Bennett,*

The judges remarked that the number of photographs received was smaller than at the last two exhibitions. Among other causes, one that had influenced the exhibition unfavourably was that the date was almost the same as that of the Royal Photographic Society. The quality of the work was distinctly good. There were very few pictures that did not show merit, and that might be regarded as a strong and gratifying feature. Almost all the photographs were thoroughly good technically, and in addition were of high pictorial quality. They showed artistic perception, aim, and achievement. They served to illustrate the capabilities of photography as a means of artistic expression. In the landscape and architectural classes the mounting and framing might be highly commended. The mounts consisted almost exclusively of papers of soft grey and brown tone. In the portrait and figure

classes, unfortunately, white and very light tone mounts had been freely used, with the regrettable effect of destroying the tone values of the pictures.

Awards:—Landscape and marine—First silver medal, "The Shambles," York, by J. B. Portman, jun.; commended, "The Night Watchman" and "The Monarch of the City," by the same worker. Second silver medal, "December," by W. L. F. Wastell, F.R.P.S. First bronze medal, "The Work-a-day World," by John Keane.

Portraits, figures, studies, etc.—First silver medal, "Portrait of an Artist," by Frank Birch. Second silver medal, "Dick" (a child's portrait), by E. Walmisley. First bronze medal, "A Market Place," by W. A. J. Hensler.

Architecture—Second silver medal, "The Triforium," Gloucester, by T. M. Weaver. First bronze medal, "To the Chair, Beverley," by J. B. Portway, and the "The South Aisle, Winchester Cathedral," by W. H. H. Mayne.

Still life, flowers, and any subject not included in the preceding—First bronze medal, "Chrysanthemums," by T. M. Weaver; commended, transparency in natural colours, "Study of French Fishermen," by Vaughan T. M. Paul.

ART NEEDLEWORK.

JUDGES:—*Lady Mary Trefusis, Mesdames C. R. Broad, W. A. Ingram, and M. V. Bull, the Misses Tweedy and E. Blight.*

The judges greatly regretted the small number of exhibits. Awards—First silver medal, Mrs. G. B. Rooth, for a red chasuble embroidered in gold. Second silver medal, Miss B. Crewes, for Honiton lace. Second bronze medal, Mrs. Jocelyn Barnes, for landscape in needlework. Certificate of merit, Miss Edith Hancock for needlework picture, and Mrs. K. A. Jennings for drawn thread centre; First prize, Miss A. Newton, crochet tablecloth; Second prize, Miss Lizzie Prior, for crochet tea-cloth.

ORNAMENTAL ART.

JUDGES :—*Miss E. Holland, Mrs. W. A. Ingram, Mrs. F. J. Stephens, Mr. A. A. de Pass, and Mr. F. J. Fox.*

Awards :—First silver medals, James Doel, for hammered iron-work, and R. T. Dick, for enamelled jewellery. Second silver medals, F. A. George, for art enamelled jewellery, and Mrs. E. Bickle, for hand-made jewellery. Certificate of merit, F. C. Cleames, for a model of a Cornish stove in silver.

SHORTHAND AND TYPEWRITING.

JUDGES :—*Messrs. J. Lanyon and W. L. Fox.*

For the shorthand there were seven competitors. The test was a passage read at 80 words a minute for two minutes. After taking into consideration the accuracy and neatness of the shorthand notes, the accuracy of the transcript, and the time taken by each competitor in transcribing, the awards were made as follows : 1, N. Yeo, Camborne ; 2, Miss D. Corin, Penzance ; 3, W. J. Tregoning, Redruth ; 4, Miss E. Mitchell, Redruth. In view of the fact that Mr. Yeo was awarded the first prize last year for a good rate of speed, the judges thought he should have written this two-minute test without making a single error. Miss Corin gave a neat and fairly accurate transcript in very good time. The neatest, but not the most accurate transcript was given by Mr. Tregoning. With regard to the typewriting, there was only one competitor, Mr. S. Shepherd, of Hayle, who typed fifty words neatly and almost accurately in one minute, and was awarded first prize.

SCHOOL OF ART AND TECHNICAL CLASSES.

(CORNWALL COUNTY COUNCIL).

JUDGES—*J. Noble Barlow, J. E. Downing, L. A. Pownall, William Cox, H. S. Tuke, A.R.A.*

The Judges were much impressed with the exhibits, which, they considered, showed a marked advance in quality when

compared with former exhibitions, and the work generally was much superior to the exhibits in the Society's open classes.

They made the following awards :—

Silver Medals—Mrs. E. Bunt, Falmouth ; Marie L. Venning, Liskeard ; Newton H. Penprase, Redruth ; Carrie Glasson, Helston ; Romey Sanders, St. Austell ; and Charlotte Matheson, Liskeard.

Bronze Medals—Mrs. E. Bunt, James C. Middleton, Redruth ; Margaret Barlow, Falmouth ; Amelia Mary Bell, Redruth ; Edith J. Gill, Redruth ; Florence M. Eustice, Camborne ; Annie Gertrude Bond, Camborne ; Charles S. Dunstan, Truro ; Freeman McLean, Truro ; Gladys Brown, Liskeard ; Adelaide Jago, Camborne.

Certificate of Merit—Florence H. Bryant, Truro ; Thomas H. Victor, Penzance ; Barbara L. Henry, Falmouth ; Mabel Polkinhorn, Truro ; Abraham J. Nicholls, Penzance ; Dorothy Nicholls, Liskeard ; A. M. Ellis, Penzance ; Annie G. Bond, Camborne ; Charles W. Chard, Falmouth ; Kenneth A. Mallett, Truro ; Newton H. Penprase ; Gladys I. Jarvis, Redruth ; Miss Dorothy Downing, Falmouth ; Florence M. Eustice, Camborne ; Frank Hocken, Redruth ; B. B. Hancox, Redruth.

Presidential Address.

27TH AUGUST, 1912.

THE WEATHER.

BY THOMAS HODGKIN, D.C.L., LITT. D.

MANY years ago, I believe in the late seventies or early eighties, an excellent lecture was delivered at Falmouth on the meteorological apparatus at the old Observatory. All the hearers were much interested and no doubt went away to their homes delighting in the advances which Science had made in that generation. That same night a gale of exceptional ferocity swept over Falmouth, doing considerable damage to property, though, happily, I believe, not accompanied with loss of life.

I heard the story of this lecture and this storm from the late Dr. Daniel Tuke, who added the comment: "If only the lecturer had been able to predict the storm, what a splendid advertisement that would have been for the Observatory."

Our methods of observation have probably been improved since that time and if the experiment were to be repeated probably the lecturer would be able to announce the coming tempest. Still, however, the forecasts of future weather which we get from our meteorological stations do not look very far ahead. Like the stockbrokers' reports they "take short views" and they would probably disclaim all pretension to predict the weather a year or even a few months ahead. Yet surely this is the goal which meteorology ought to aim at, may I not say is aiming at? and when she has achieved it she will be eminent among the sciences as a benefactress of the human race.

I suppose we have all asked ourselves at one time or another "Why is the weather of the not very remote future so utterly incalculable? It depends in large measure on causes varying indeed, but whose variations can be known and calculated beforehand. We shall all admit that the two great factors in the production of climate are the heat of the sun and the revolution of the earth. Now the position of the sun in the ecliptic, though continually changing, changes according to an invariable law, and the earth swings round upon its axis in a period which can be calculated to a second. "Like causes," we say, "produce like effects." Since the sun occupies to-day, on the 27th of August, the same place in the constellation Virgo, within about six hours, which he occupied on the 27th of August, 1911, why should not the weather to-day be a precise replica of the weather on that date and on all preceding 27ths of the same month?

Please observe that I am not asking the foolish question "Why is our climate variable?" Placed here as we are on the edge of battle between the heaving Atlantic and the vast plains of Central Europe, with the Gulf Stream (not yet I trust disestablished) bringing us its welcome contribution of warmth and moisture, our climate is necessarily one of constant change; but what I am asking is, "why is not the law of this change itself unchangeable? Why, since the movements of the heavenly bodies are fixed and calculable, are the characters of successive years so absolutely different from one another? Why, for instance, have we seen the glorious warm summer of 1911 followed by this heart-breaking cold and wet summer of 1912, the sun all the while, if we could only see him, holding exactly the same place in the heavens which he held twelve months ago?"

"This is what we are all trying to make out" I know that my meteorological friends will tell me. "Have patience and perhaps we shall some day be able to answer your questions, which are very like those of an intelligent child. You remember the

description of the two classes of persons who should not be allowed to look on half-done work." I accept the rebuke and will wait in patience for the crowning of the meteorological edifice, only saying to the builders, very heartily, "more power to your elbows." For I must think, as I have already said, that the ability to forecast, even for one year, the character of the seasons will be one of the greatest gifts that Science can confer on humanity.

What are the points of *difference* which we can recognise as possibly existing between one year and another?

Speaking only from my unscientific point of view, I will venture to mention a few that occur to me.

1. In the first place, there is the fact that the sun's relation to the moon differs in different years. This 27th of August, which happens this year to be the day of full moon, was last year the third day from new moon. Can this difference seriously affect the weather? Could it do more in any case than accelerate or postpone by a few days some climatic change?
2. Is it possible that the planets may count for something in the determination of our climate; that the approach of Venus or the recession of Mars may have some effect on the currents of air which form the rain-cloud? If it should be proved that there is any such influence exerted by the planets we shall get back by devious ways to something like the calculations of the old astrologers.
3. Spots on the sun? We in this place have a special interest in these because a member of the Polytechnic Society, the late Rev. William Rogers of Mawnan Rectory, was a diligent and persevering student of their recurrence. But I think it seems to be generally admitted that they cannot have any considerable influence on the climate of our planet.

4. Volcanic and seismic disturbances? We who remember the wonderful effect produced on our sunsets by the eruption of the volcano of Krakatoa can easily understand that in such phenomena as these there may be a *vera causa* of some of the vagaries of the weather.
5. But, after all, is it not probable that it is in the *cumulative* effect of some of the great constant agencies around us that the chief inconsistencies, the perplexing irregularities of the weather find their explanation? The sun, it may be said, shines always on our planet with equal power, but his strife against opposing forces may be like Freedom's battle, once begun

"Though vanquished oft, yet ever wins."

Take, for example, the ice at the Pole. Perhaps it goes on accumulating year after year and it seems as if it were going to vanquish the heat of the Southern sun. But all the while the Gulf Stream, coming warm from the Tropics, is undermining some great isthmus of ice which connects a projecting ice-island with the continent. It seems as if it were making no impression, but each year shows the work carried a little further and at last in the early months of 1912 it achieves its victory, breaks through the ice-isthmus, and sends a vast field of ice floating down into the Atlantic to wreck the "Titanic" and to ruin the hopes of the English harvest. This is the sort of process which we may imagine going forward with cumulative force year after year and it is in some such way as this that I imagine for myself the uniformity of the years broken, and the clock-work regularity of the sun's movements made to coincide with the infinite irregularity of the English seasons.

But still these causes of change are all capable of examination and analysis. Must we for ever dismiss the hope of discovering and classifying them as impossible? That is to say, will the

mind of man, which has solved so many difficult problems, never discover the true causes of the diversity of the years? And therefore must we for ever renounce the hope of framing an accurate forecast of next year's weather? Think what an incalculable addition to the wealth of nations such a forecast would be. The meteorological department would be enabled to say with confidence to the English farmer: "A fine dry summer is ahead of us; you may sow your wheat with confidence, but hasten the ingathering, for you cannot reckon on a dry September." Another year: "Continual rain all through the summer months is probable. Leave the cereals alone and devote yourself as much as possible to root crops." To the Australian farmer: "There is every reason to fear a year of absolute drought. Pursue your irrigation works to the utmost and if you cannot keep your flocks and herds near some river or reservoir, turn them into cash as fast as you can."

Think of the millions of money which accurate, reasonably accurate, forecasts of this kind would save to the Commonwealth. Think also of the splendid opportunities which the British Navy has of collecting information on which such forecasts might be founded, from the Arctic Zone to the Tropics. Would it not be worth while to stop the building of one or two Dreadnoughts and spend hundreds of thousands on scientific work of this kind, work which brings no hatred, no jealousy or bitterness of competition, but in which all would labour for the good of all, and the great nations of Europe and America would stand shoulder to shoulder striving for the common good of humanity.

History in Cornish Place-Names.

BY HENRY JENNER, F.S.A.

(A lecture given before the Royal Cornwall Polytechnic Society at Falmouth, 27th August, 1912).

THE subject of this lecture is stated to be "History in Cornish Place-names," and I do not intend to overload it with details of etymology to illustrate that subject. What I want to show is, first that Cornwall really has a history of its own, of which we do know something, and, of which, I think, most of us would like to know more ; and secondly that there is good reason to suppose that a comparison of the place-names of Cornwall with the statements and names of places and persons occurring in the Lives of Celtic Saints, in the Histories of Gildas, Bede, Nennius and others, and in Welsh chronicles, genealogies, triads, tales and poems, will be found to illustrate that history. This the place-names may do by tending to show the real existence of persons whose names are otherwise only known to us from legends, chronicles, poems, etc., that were written long after the events to which they relate, and on which, without some other confirmation, we should not place much reliance. And the moral of this is that a careful study of Cornish place-names is a very desirable thing, from which we may gain, not only philological and lexicographical knowledge, which does not appeal to everyone, but also some amount of history.

I need not remind a Falmouth audience that most of the place-names in Cornwall are not in English, but are in a Celtic language.

Herein to begin with there is history. This fact must have a reason, and the reason is that from the earliest times of which we have any definite historical knowledge down to about the end of the 15th century, the great bulk of the people of Cornwall habitually spoke, not English, but Cornish, which did not die out completely until very nearly if not quite the 19th century. Cornish is one of the Brythonic or British branch of the Celtic languages. The others of that branch are Breton and Welsh. Cornish and Breton are so nearly allied that probably a thousand years ago the people of Cornwall and Armorica spoke forms of the same language, differing no more from one another than do the spoken English of England and that of America at the present day. One can "spot" an American by his accent and by a peculiar use of certain words and expressions; but if he writes a book or a letter, and does not happen to use certain affectations of spelling usual with American printers, one would have great difficulty in telling to which nation he belonged. We do not know whether there was a Breton accent which differed from a Cornish one in the 10th century, but were we to meet with a manuscript of that date, which must be in one or the other of those languages, we should have great difficulty in determining which it was by language alone. In process of time the two languages drifted apart, but even down to the 18th century the few remaining speakers of Cornish could make themselves understood in Brittany. Only some nine years ago I tried the experiment of a Cornish speech on an audience of educated Bretons. They understood almost all of it. But when I tried the same experiment at two Welsh Eisteddfodau, the Welsh audiences could make nothing of my speech, though some of the more intelligent recognised a few words.

There is history in this also. Just before the Saxons came to Britain there were probably at least two well-defined dialects of British, the Northern and the Southern. No doubt they had a

common origin, how long ago we know not, and probably the speakers of the two could get along fairly well together. In the east, and especially in the south-east of Britain, and everywhere in the towns, there was a great deal of Latin spoken. Mr. Haverfield, our greatest authority on Roman Britain, seems to think, on the evidence of discoveries at Silchester and elsewhere, that in the Romanised parts of Britain everyone spoke Latin. In what is now Wales, and perhaps in Cornwall also, there were colonies of Goidels or Irish, who spoke the ancestor of the present Gaelic of Ireland, the Highlands of Scotland and the Isle of Man. There were also Picts, who probably spoke a Celtic language of some sort, and probably some pre-Celtic aboriginal tribes, who spoke we know not what. In about 410, according to the story, Cunedda or Cunedag, a North British chieftain, came with his twelve sons and a large retinue from Manau Gododin, a district to the south of the Forth, and drove the Goidels out of South Wales. Not much is known of this Cunedda, and his story is very legendary, made none the less so by the ultra-imaginative character of Welsh historians. But we may take it that it represents a real migration from the North into Wales, and that with this legendary story there is fact mixed up. Thus the northern dialect got to South Wales. In the next century, under Caswallon Law Hir, the great-grandson of Cunedda, and his son Maelgwn of Gwynedd, it spread to North Wales. What we now call "Welsh" represents that dialect in a modern form, and such British names as are still found in the Strathclyde country, between the two Roman Walls, where the spoken British has been extinct for many centuries, are in the same dialect. The southern dialect of British is now represented by Breton as a living language, and, until its final extinction as a spoken tongue in the late 18th and early 19th centuries, it was represented by Cornish also. And our place names, like those of Brittany, represent it still, and show us among other things that

the Cornish and the Bretons came from those Britons of the South who were not sufficiently Romanised to have lost their language in favour of Latin, when they were driven south-westward and across the Channel by the Saxon invaders, with cases, no doubt, where Latin speakers and their descendants reverted eventually to the language of the majority.

The history of the Saxon conquest of Eastern Britain is very obscure. Gildas, a rhetorical writer, chiefly occupied in girding at all and sundry, is our earliest authority. He does not profess to be much of an historian, which is just as well, for he was not one. But a good deal may be gleaned from his ill-tempered scoldings of nearly everybody. The "*Historia Britonum*" attributed to Nennius, part of which was originally written, perhaps in Welsh, in the 7th century, explains some of Gildas's allusions, and adds to our knowledge; but Nennius was rather a muddle-headed person. The Anglo-Saxon Chronicle tells a fairly consistent story from the Saxon point of view, but, carefully omitting all reference to reverses, is rather reticent about events in West Britain in the last few years of the 5th century and the first half of the 6th. Bede, writing in about 730, is also rather reticent about the same period, though, copying from Gildas, he does mention the successes of Aurelius Ambrosius and the British victory of Mons Badonicus. As Gildas, it is supposed by some on account of a personal quarrel, does not mention the name of the victorious leader, Arthur, Bede omits it also. All agree, however, in giving the Britons a comparatively quiet period from that victory, which, as may be inferred from Gildas and Nennius, was in 516, until 552, when the westward progress of the Saxons began again with the defeat of the Britons at Old Sarum, and the establishment of the kingdom of Wessex. In 556 and 571 there was more fighting, and the remnant of the Britons were driven from cities in the east, Bedford, Banbury, Aylesbury and others. But all this time the whole western part of Britain from

the Clyde to Cornwall, and a great deal of western Gaul, from the Channel to the Loire, were in British hands, and during a considerable part of it formed one Empire, made up of states under local Kings or Dukes, united under the overlordship of a "Gwledig" or Emperor on the Roman model, and in constant communication with one another. Gildas, writing in about 550 or 560, addresses his cantankerous remarks to five British kings, Vortipore of Dimetia, which is now Dyfed, that is to say, Pembroke, Carmarthen, and Cardigan; Maglocunus, who is certainly Maelgwn of Gwynedd, which is North Wales; Conan, whom he calls Aurelius, who from other sources is known to have ruled Powys; Cuneglas, who probably ruled in Gwent, that is, Monmouth and Glamorgan; and Constantine of Damnonia, which is certainly Cornwall and Devon, and in those days included much, if not all, of Somerset and Dorset.

The separate history of Cornwall or Damnonia begins very late and leaves off very early. We know next to nothing about its history before 400; something during the 5th to the 8th centuries; and a little from the 8th to the Norman Conquest of England in the last half of the 11th century. After that it is merged in the general history of England, some events connected with which happened to take place in Cornwall. Something is known of a royal family of Damnonia, which according to Welsh authorities seems to begin with Cystennin Gorneu, Constantine of Cornwall, as the Welsh genealogists call him. He has been identified with the usurping Emperor Constantine, who was proclaimed by the army in Britain in 407, took possession more or less of Gaul and Spain, and, after having been defeated and captured at Arles, was put to death by order of Honorius near Ravenna in 411. This identification is possibly not wholly fantastical, as we shall see later.

The 6th and 7th centuries were the "Age of the Saints." It was then that missionaries from Ireland, in the new fervour of

its conversion by St. Patrick, came over in crowds. It was then that missionaries from Wales, scions of the Houses of Cunedda and Brychan, or monks of the great foundations of St. Illtyd in South Wales and St. Cadvan on Bardsey Island, passed through Cornwall to Armorica, setting up religious establishments on their way. And it was then that Cornwall itself, under the encouragement and example of the royal house of Damnonia, sent forth missionaries of its own to other lands. From the tangled and muddled mediæval lives of these saints, derived from half-understood earlier sources, a great deal of history may be gleaned. There is reason to think that whatever there is of real history in the beautiful mediæval romance of Tristan and Ysolt, the best story of them all, may be assigned to the middle part of this period. There does seem to be some real history in it, and M. Joseph Loth, Professor of Celtic Languages in the University of Paris, the best living authority on all things relating to Celtic Cornwall, has shown very convincingly, in a book which will appear shortly,* and of which I have heard the general argument by word of mouth, that the 12th century writer of the original French romance not only laid the scene of his story in Cornwall, but derived his information from a Cornish source, and was remarkably accurate in his topography. It is not until late in the 6th century that Cornwall begins to have a history quite separate from that of the rest of Britain. Though, like other parts of the country, Damnonia was ruled by its own Kings, it was not cut off from the rest of Celtia. Even the ecclesiastical history was largely in common, for the missionary saints drifted about freely between Cornwall, Wales, North Britain, Armorica and Ireland. The battle of Derham in 577, after which the Saxons took the strong fortresses of Gloucester,

* Since the delivery of this lecture this very valuable book, "*Contributions à l'Étude des Romans de la Table Ronde*," has appeared. A review of it is printed in this Report.

Cirencester and Bath, cut off Damnonia from Wales. The separated kingdom included all Cornwall and Devonshire and a good deal of Somerset. In 601 we find a king of Damnonia, possibly that Gerennius, Gerontius or Gerrans, who lived at Dingerein in Gerrans across the Harbour, granting the lands of Ynyswitrin, which is Glastonbury, to Worgrez the Abbot, and for some time after that we find abbots there, whose names, as William of Malmesbury rather rudely expresses it, "imply British barbarism." Then came in 658 the conquests of Cenwalh of Wessex; and Glastonbury and the lands beyond the river Parrett passed into Saxon hands. The next Abbot is the Saxon Berthwald, who after a period as Abbot of Reculver in Kent in 693 succeeded Theodore of Tarsus as Archbishop of Canterbury. All Devon was in the 7th century British kingdom of Damnonia, so one of the greatest men of the day, Winfrid, better known as St. Boniface, the Apostle of Germany, if he really was born at Crediton, must be claimed as a Cornishman, for he was certainly born before 700. If Winfrid is the equivalent of the Welsh *Gwenfriw*, fair countenance, one understands how he Latinised his name into *Bonifacius*. It may be so, for a feminine saint-name, *Gwenfrewi*, becomes *Winefred*, with the added *d*, in English. Early in the 8th century we find St. Aldhelm, Bishop of Sherborne, who died in 709, addressing a letter to another Gerontius, a very independent king of Damnonia, against whom, according to the Anglo-Saxon Chronicle, Ina of Wessex and Nun his cousin fought in 710. It was during that war, according to a legend which you need not believe unless you like, that the Cornish were greatly encouraged by "the Great Vision of the Guarded Mount," the Apparition of St. Michael the Archangel on the summit of Dinsul, or Carrak Luz en Cuz, the Grey Rock in the Wood, on the 16th of October, 710. But they also appear to have had the assistance of Ivor son of Alan King of Brittany.

The details of the Saxon Conquest after this are not very clear at first. According to the Welsh chronicle, in 720 there were three battles in which the Britons were victorious. One of these was at "Heil" in Cornwall, one at Garthmaeliawe or Gwarchmaeliawg, wherever that may be, and the third at Pencoeed in South Wales. This is quite probable, for the Anglo-Saxon Chronicle records nothing whatever for 720, and it is the practice of that work to ignore British victories—such untoward events are better forgotten. The Welsh chronicles impartially record defeats as well as victories. I fear they would have little to say if they did not.

Through the 8th century the Britons seem to have held their own in Devon; but with the coming of Egbert, a really able man, matters were changed. The Damnonians were driven back and defeated in 823 at a place called "Gafelford," which may mean the "Fork of the Road." Mr. Baring Gould, and after visiting the place recently in his company I am disposed to agree with him, identifies this with Galford in his own parish of Lew Trenchard, where there is a remarkable fortified hill at the fork of two valleys. It used to be held to be Camelford, but there are several reasons against that. One is that though an original "Camelford" might conceivably change to "Cafelford" and "Gafelford," a change the other way is so improbable as to be disregarded. Later, in 835, Egbert gained another victory at Hingston Down, near Callington, over an allied army of Britons and Danes. If those are right who identify Callington with the "Kelliwic in Cornwall" of the Welsh Arthurian stories,* he may have been making for the capital city, or at any rate the royal residence. The usual legend is that Egbert conquered Cornwall, but we certainly find independent kings going on long after his time, notably Dwrnigarth, King of Cornwall, who according to

* M. Loth thinks that the fort in Gweek Wood (which in Cornish might be "Kelly-wik") near Helston may be the real "Kelliwic" of Arthur.

the Welsh "Brut y Tywysogion," was drowned in 875. It is probably his name which is found on the inscribed stone at St. Cleer, in the Cornish form of "Doniert." Also it is plain that for another century the Britons occupied a great part of Devonshire, including part, the northern part, of Exeter. Here to this day there is history in place-names, for in what was once the British quarter the church dedications are all Celtic, St. David, St. Petrock, St. Sidwell, etc., while in the Saxon part they commemorate the Saints common to all Christendom, St. Mary, St. Thomas, St. Lawrence, etc. It was in about 936 that Athelstan drove the Britons out of Exeter. They must have been there, or he could not have driven them out. William of Malmesbury says that he "fiercely attacked them and obliged them to retreat from Exeter, in which until this time they had dwelt with equal rights with the English, fixing the frontier of their province on the other side of the Tamar, as he had appointed the Wye to the North Britons. And when he had cleansed the city by purging it of this contaminated race," William evidently did not like Britons, "he fortified it." This certainly seems to point to the Cornish being independent within their own limits. Yet there were colonies and settlements of Saxons in Cornwall even earlier, for Alfred undoubtedly had possessions there, and St. Neot, who certainly lived at the place called after him, was a near relation of Alfred's. Some say he was his brother. The oft-repeated legend that Athelstan over-ran Cornwall, fought a battle at Boleit in Buryan, founded the collegiate church there and sailed from Sennen Cove to Scilly, where he founded Tresco Abbey, does not rest on any solid foundation. Even the Anglo-Saxon Chronicle does not mention it. "Hoel subregulus," who witnesses charters of Athelstan, has been held to have been king of Cornwall; but he is clearly identical with the Howell, king of the West-Welsh, of the Anglo-Saxon Chronicle, whom Athelstan subdued in 926, and with the "Iothwell, king of all

Wales" of William of Malmesbury. Both these say that he and Constantine, King of the Scots, were subdued and driven from their kingdoms and later restored as vassal kings. Though "West Welsh" in the Chronicle generally means Cornish, I think this Hoel must be identified with the celebrated Howel Dda, the Welsh law-giver, who certainly was king of all Wales, and according to the Welsh authorities "went to Rome" in that year. But be this as it may, there was a good deal of Saxon influence, at any rate in East Cornwall, in the 10th century. Wulfsige the Bishop (967 to 980), the kings Edmund (940 to 946) and Ethelred (979 to 1016), and many others with unmistakable Saxon names, are among those who freed serfs at the Altar of St. Petrock, and recorded the same in Latin or English in the Bodmin Gospels. But even there a large proportion of the manumitters have British names, as have nearly all the witnesses, and some of the manumitted have Saxon names.

The story of the final break-up of Cornish independence or autonomy is rather vague. At the time of the Norman Conquest the Earl of Cornwall was Condor or Cador. The name is British, and he seems to have been the last of the royal house. But his predecessors in title, Ordgar, Eadulf, Ethelmar and Algar, bore Saxon names. He was dispossessed of his earldom, which was given to Robert Earl of Mortain. In the Domesday Survey nearly all the tenants have Saxon names, though that does not conclusively prove that they were Saxons. But it was with the Norman Conquest that the separate history of Cornwall ended. Thenceforth, though the Cornish considered, and still consider themselves to be Cornish and not English, their history was inextricably mixed up with that of England. They were in a position that the Welsh were in after the conquest by Edward the First in 1282. From time to time, as in 1497, 1549, and during the Great Rebellion, Cornwall acted on its own, without much reference to how England might be acting, but it was as a factor in English history, not as a separate country.

The history that may be recorded in place-names belongs almost entirely to the period before the Conquest.

The place-names of Cornwall, as of other countries, may be classified as follows :—

1. The name of the country itself.
2. The natural features; hills, valleys, rivers, cliffs, rocks, headlands, creeks, lakes, moors, woods, etc.
3. The artificial features or arbitrary divisions; districts now called "hundreds," parishes, manors, tenements, farms, towns, hamlets, houses, fields, churches, monastic establishments, castles, hill-forts, etc.

The name of the country itself has history in half of it. Whatever may have been the origin of the first part of the name, there is no doubt about the second. "Kernow," "Cernyw," or whatever its earlier form may be, was possibly derived from the name of the tribe which dwelt there, or it may mean "the Rocky Land" or "Land of Carns," or the "Horn-shaped Land." Certain it is that it is not the only "Cernyw" or "Cornyw"; for a part of North Wales, which seems to have included Anglesea and the peninsula of Lleyn, was once so called, and there is a parish called "Llanfair yn Nghornyw" in Anglesea to this day. There was another "Cernyw" in South Wales. But though we can not account satisfactorily for the "Corn," there is no doubt about the "Wall." *Wall*, *Wealas*, *Welsh*, *Wallach*, are names applied by Tentons to foreigners, and especially to foreigners who belonged to the Roman Empire. In old German, and even now in some dialects, for instance in the patois of the isolated German villages of the "Sette Comuni" near Bassano, and "Tredici Comuni" near Verona, Italy is called "Wälschland." "Wälsche Schweiz" is still used for French Switzerland, "Red Welsh" (Roth Wälsch) is the German for slang or thieves' talk, and we have the same word in the name of the "walnut," which is the "foreign" nut. Cornwall, therefore, is the Kernow of the

Foreigners, that is to say, of the Britons. What "Damnonia," a word now represented by "Devon," may have meant originally is not quite certain. It may have been called after the tribe of the Damnonii or Domnonii, who settled there, or they may have been called after it, for the Welsh form of the name, "Dyfnaint," would mean the "Land of Deep Valleys," which is just what it is.

There is not much history in the names of natural features. Often they are nothing more than the Celtic words for the features themselves. There are hills which are merely called "Brea," or "Bron," hill, rocks which are only "Carrack," rock, or "Angarrack," the rock. Several headlands are just "Pentire," headland. There are three "Heyls," which are called nothing but "the River," just as in Wales and England there are several "Avons," which only means river, and "Esk," "Usk," "Exe" and "Ax," which are only varieties of that word for water, which is familiar to us all in the Gaelic word "whisky," an abbreviation of "uisge-beath," water of life, "eau de vie." Often the epithet is of the simplest. "Bron Ewhella," now Anglicised into "Brown Willy" is only the Highest Hill, which is just what it is; "Carrack Luz" is the Grey Rock; "Cambron," now Camborne, the Crooked Hill; "Pencoyse" the End of the Wood. But except so far as some of them may be mentioned in history, we need not trouble ourselves much about the names of natural features.

With the names of artificial features and arbitrary divisions it is different. Though a considerable proportion of both of these are purely descriptive, a very large number, perhaps the majority, contain personal names.

The great divisions, now called "Hundreds," were made at an early date. It does not seem that they ever were "hundreds" in the English sense, that is, groups of a hundred households or families, taken together for administrative purposes, unless they were formed during a period of Saxon domination when only

Saxon householders were counted, and I do not know that there ever was such a period. Otherwise they are too large. There are only nine of them, while in Devonshire there are 33, in Dorset 34, and in Kent no less than 63, one of which, well-known to me, consists of only two small parishes, containing 550 inhabitants between them. Most counties have 30 or more. The Cornish word was "keverang," which is the same as the Breton "kevrenn," a part or division. The word occurs only in a passage in the Drama of St. Meriasek, where "keverang Penweth," the Hundred of Penwith, is mentioned, and, in the plural, in the name of a place a little to the north of Scorrier station, "Keverangow," the Hundreds, where the four hundreds of Penwith, Kerrier, Pyder and Powdar, meet in one point.

There are about 220 old parishes in Cornwall. All but about 50 are called after the names of saints. Of these only about 25 are called after other than British and Irish saints, and several of that 25 are named after Gaulish saints, such as St. Hilary, St. Martin, St. Dennis, St. German and St. Symphorian. There remain about 145 old parishes called after Celtic saints, Irish, Welsh, Breton or Cornish, and there is every reason to suppose that the saints after whom they were called were in their lifetime personally connected with the places. There are also a considerable number of parishes where, though a Celtic saint is not commemorated in the name of the parish, which has been given for some other reason, the church is under the patronage of one, and his connection with the place is undoubted.

Before one can understand the Celtic saints properly, it is necessary to understand clearly what the Celts of early days meant by the word "saint." It was not used in the modern technical sense of a person on whom the title has been conferred by the Church after his death by canonisation, or some other process, differing in different times, on account of his martyrdom or holiness of life. Nor was it used as we use it loosely now to

signify some person, perhaps still living, whose life is especially holy. But rather was it used in a sense not unlike that in which it appears to be used at any rate in some passages in the Acts and in St. Paul's epistles.* The early Celts meant by the word a member of a class set apart, which took the form in their day of what we should now call "religious," that is, monks or nuns, persons who had taken upon themselves what is now known as the "religious life" in a technical sense, or, as Mr. Baring Gould thinks, the name may have been applied only to the chief of a religious settlement.† And just as when we speak of a "religious" we refer to profession, not necessarily to practice, so an early Celtic Christian only meant by "saint" one who had adopted a certain profession. No doubt many of them were holy men by any sort of standard, and one of the ways in which they showed it was in their earnest desire to impart the benefits of Christianity to others. So it was that a very large number of them, and especially those who had come, directly or indirectly, under the influence of such great revival leaders as St. Patrick, St. David, St. Cadoc, St. Cadvan, and St. Illtyd, went about as missionaries, forming religious or monastic settlements, which eventually were called after the names of the founders, in the midst, not only of the heathen, but also of the uncommonly slack Christians that the average Britons seem to have become.

It has been rather the fashion of late to attempt to map out Cornwall into Irish, Breton, Welsh and native Cornish saint-districts. I think my old friend that excellent antiquary, William Copeland Borlase, set this fashion in his "Age of the Saints." He would now be the first to admit that his generalisation was too exact, especially if he had seen it argued, as I saw recently, that St.

* *e.g.* Acts ix. 32, 41; Rom. xv. 25; 1 Cor. vi. 1; 1 Cor. xvi. 1, 15; 2 Cor. ix. 1.

† See his Address as President of the Royal Institution of Cornwall, Journal R.I.C., vol. xiv., p. 42.

Just of Penwith could not possibly be the same saint as St. Just of Roseland, because Penwith was in an Irish "sphere of influence" and Roseland in native Cornish one. But though that is carrying the argument too far, there is something in it. Missionaries did come over in bands and settle in groups. St. Ia comes over from Ireland with twelve companions, Erc, Uny, Piala, Fingar or Gwinear, Crowenna, Breaca, Germoch, Gothian, Elwyn, Sennen, Helen, and Etha. They land at Hayle, and form settlements all round, and so we get St. Erth, Uny Lelant, Phillack, Gwinear, Crowan, Breage, Germoe and Gwithian all in a cluster, and at a little distance, outside the group we find Sennen at the Land's End and St. Helen's Chapel at Cape Cornwall, Landithy, perhaps the settlement of St. Etha, at Madron, and possibly St. Elwyn's Church at St. Allen. Near this cluster of saints, in St. Erth parish, is a place which may well be associated with them all, though it may be a separate foundation. Just on the boundary of St. Erth and St. Hilary, where there is a rectangular camp, which seems to be Roman, is "Bosence." This can mean nothing else than "the Dwelling of the Saints." But of what saints we do not know. This we may compare with that very interesting village of hut-clusters in Gulval parish on the slope of the western Castle-an-Dinas. Borlase in his "Age of the Saints" points out certain resemblances of the hut clusters to Christian settlements of a religious character in Ireland and the Isle of Man, and mentions that they are locally called "the Chapels." There is a cavity uncommonly like a holy-water stoup at the entrance to one of the chambers, and it may really have been a chapel. But one possible meaning of the name has not hitherto been pointed out. "Chysoister" is quite likely to mean "the House of the Sisters," that is to say, of the Nuns. Quite close by is "Bosulval," which can only mean "the Dwelling of Gulval," after whom the parish is named. Not much is known of her, except that she was the sister of St.

Paul of Léon, and is associated with another sister, St. Sativola or Sidwell in the dedication of the church of Laneast. It may be that Chysoister was a convent of nuns founded by her. The word *soister*, *suster* or *soster*, though obviously an English loan-word, was certainly, like many other English words, adopted into Cornish, and may have been used in this special sense, just as we use the Latin word *frater*, in the form *friar*, which came to us through French, for the equivalent sort of "brother."

There was evidently a Breton colony in the Lizard district, where we find SS. Sezney, Corentin, Gwenolé, Ronan, Meugan and Kynan commemorated at Sithney, Cury, Gunwalloe, Landewednack, the two Ruans, Mawgan and Kynan's (Kynance) Cove, with such distinctively Gaulish Saints as Hilary and Martin not far off. There is a similar cluster of Breton saint-names in and near St. Columb, "Trekenning" is probably Kynan's Town, "Trewan" is probably "Tre-Ruan," and Sezney, Donan, Hern or Hernin, and Meugan are the names which seem to come into "Tresithny," "Trebodannan (Tre-bod-Donan)," "Lanherne" and "Mawgan." The connection of these saints with the places is not here quite so clear, and there is reason to attribute these dedications to later Breton colonies, perhaps in the time of the 10th century Alan Barbetorte, to whom Athelstan was godfather. Bretons fled from the attacks of the Normans in his time, and some certainly settled in Cornwall. Perhaps to the same migrations may be attributed the dedication of Camborne in honour of St. Meriadoc, a Bishop of Vannes in the 7th century, who is not likely to have come to Cornwall, and, if he did, was not likely to have come in contact with King Teudar, as the Cornish drama makes him. Teudar lived at least 140 years before St. Meriadoc's time.

It would take too long to analyse the saint-names of Cornish parishes fully, but I may point out that such an analysis shows that the saints or missionaries commonly did settle in groups,

and that groups of parishes are frequently found named after saints who according to their legends are connected with one another. This of course might not necessarily prove more than that some mediæval romancer, knowing the district, connected the saints of neighbouring parishes in his fictions. But when the parishes are in Cornwall, and the Lives of Saints come from Wales, Armorica or even Ireland, this explanation will not do. I am disposed to believe that though the Lives of the Celtic Saints are often muddled and full of anachronisms, and contain a miraculous element natural enough in a time when most people honestly thought that a saint was more likely to work miracles than not, there is a large basis of truth in them, and the names of Cornish parishes and their grouping tend to show that these saints were real men and women, though they did not necessarily do all the things attributed to them, many of which are only hagiological "common form," not deliberate fiction.

I have said that there was a Cornish Royal Family, whose names are recorded in the Welsh genealogies. The identification of the first of these with Constantine, the usurping Emperor, is rather early. Gildas says of Ambrosius that his parents, who for their deserts had been adorned with the purple, had been slain in the recent troubles. Nennius says that the father of Ambrosius was a Roman Consul, and Bede that his parents were of royal race. Geoffrey of Monmouth, who copies and often misunderstands these three writers in many things, but derives much of his information from other and unknown sources, boldly makes Constantine the father of Ambrosius, and transfers the story of Constans, the son of Constantine, who was taken from his monastery to rule with his father, and came by his end in the same struggle with Honorius, to Britain, putting Vortigern in the place of Honorius. Some Welsh authorities imaginatively trace the pedigree of Cystennin Gornen to Caradog ap Bran, the Caractacus of Tacitus. Others make him the son of Maxen Wledig, the usurping Emperor Clemens Maximus (died 388), by

Helen Llyddawg, whose brother Eudav (Octavius) is called Earl of Cornwall. This is perhaps a confusion, on account of the mother's name, with Constantine the Great. The later Constantine and his son Constans come into the general history of the Roman Empire. If the former was the same as Cystennin Gorneu, his other sons were Ambrosius, Uthyr, the father of Arthur, and Erbin, King of Damnonia. It is quite possible that the name of the last is recorded in the ancient Duchy manor of Treverbryn, and, as there is some reason to suppose that, like other members of his House, he retired to a monastery late in life, he may be the name-saint of St. Ervan. Erbin had a son Gerontius or Geraint, who succeeded him. He was made into the hero of the well-known romance of Geraint and Enid. We know the names of his sons, and that he was slain in about 522 at the battle of Llongborth, which is possibly Langport in Somerset. A fine elegy on him, of which the oldest manuscript is in the 12th century Black Book of Carmarthen, is attributed to the 6th century poet Llywarch Hen. In the parish of Gerrans, which is called after him or after a later Geraint, there is a fort called "Dingerein." St. Teilo, according to the *Liber Landavensis*, landed there when he came to attend upon the later King Gerrans in his dying moments, and Kenstec, the 9th century Cornish Bishop, had his headquarters there. As the neighbourhood, as we shall see, was connected with earlier members of the royal family than Geraint II., it is likely that this fort was the castle of Geraint I. Geraint had several sons, Salamon, called in Welsh "Selyf," and in Breton "Salaun" and "Selevan," who succeeded him; Jestyn, who is probably the patron of St. Just in Roseland, and perhaps of St. Just in Penwith; Cyngar, after whom Congresbury in Somerset is named; Caw, who was the father of Gildas; and Cador or Cado, who is the "Cador of Cornwall" of the Arthurian stories. Salamon married Gwen, daughter of Gynyr of Caer Gawch in Pembroke, and was the father of St. Cuby. It is possible that he is the saint whose name

has now become "St. Levan." There is some evidence that the name of the parish of St. Levan was once "Silevan." The form "Selevan" for "Salamon" is found in a dedication at Caudan, near Hennibont, in the Morbihan. If St. Just in Penwith is Jestyn, it may be that the very early inscribed stone in his church, SILUS HC IACIT, is his brother's tombstone. He is certainly reckoned among the saints in the Welsh genealogies. St. Cuby made two settlements in Cornwall. One was at Duloe. The name of this parish is probably derived from its position between two creeks, which unite just above Looe Bridge. Duloe is "the two lochs," to use a Scottish term. St. Cuby is the patron of the church, and in a valley called "Kippiscombe," the Coomb or Valley of Cuby, there is St. Cuby's Well. The patron of the church of the next parish to the eastward, Morval, is St. Wenn, who is certainly St. Gwen, the mother of St. Cuby, and the parish on the other side, Pelynt, has for patron St. Nun, who was the sister of St. Gwen, and mother of the great St. David. It was clearly a family settlement. St. Cuby's other settlement was at the parish called after him close to Tregony. This is quite near to what I think to have been his grandfather's castle of Dingerein, and to his uncle Jestyn's settlement at St. Just. At Grampound in Creed, the next parish, there was a chapel of St. Nun, his aunt, and a well there is called "Ventonwyn," which, if it does not mean simply "the White Well" or "the Blessed Well," is very likely to be "St. Wenn's Well." Curiously enough, an inscribed stone, built into the wall of St. Cuby church, but of later date than the 6th century, bears the name "Nonnita," which is one of the forms of St. Nun's name. This again is a family group, close to the royal castle. St. Cuby left Cornwall and went with his uncle Cyngar first to South Wales, then to Ireland, and eventually settled down at Holyhead in Anglesea, where Maelgwn of Gwynedd, who perhaps was not quite such a bad lot as Gildas makes out, gave him the fort which is now called "Caer Gybi," Cuby's Fort, where he established a monastery and

eventually died. There are two Latin lives of him in a 12th century manuscript of Llandaff origin in the Cottonian Library in the British Museum, Vespasian A. XIV. They are both taken from the same Welsh original. These say that he was born in the region of the Cornish, between two rivers "Limar" and "Tamar." As "Limar" is of course the Lynher, this points exactly to Callington as his birthplace. The only really bad blunder in these lives is that they make him study under St. Hilary of Poitiers. As St. Hilary died in 368, and Cuby's grandfather Geraint was killed at Llongborth in about 522, this seems improbable. What they probably really mean is that he studied at St. Hilary's monastery; just as when Domesday Book says that St. Petrock himself holds certain lands, it means that his foundation at Bodmin holds them. Cadur seems to have succeeded Salamon in the kingdom of Damnonia, and his son Constantine, who succeeded him, was made, or made himself, Emperor after the death of Arthur at the battle of Camlan in 537. He only held this position for a short time, and was deposed by Conan of Powys. Geoffrey says slain, but that is a mistake. When Gildas, his first cousin, addresses his scoldings to him in 550 or 560, he is only King of Damnonia, and Conan is "Aurelius," which Gildas apparently uses as the epithet of a "Gwledig" or Emperor. Gildas is not polite to Constantine. He calls him "the tyrannical cub of the dirty lioness of Damnonia." By "tyrannical" he probably means usurping. Possibly Constantine or his father had seized on the Damnonian kingdom after the abdication of Salamon. Apparently there was a party who wished and perhaps attempted to make St. Cuby king, but failed. Gildas also accuses Constantine of having disguised himself as an abbot,*

* It is not quite clear whether by "*sub sancti abbatis amphibalo*," Gildas means that Constantine had put on the "cloak of a holy abbot," or that the "*regii pueri*" had, to use a later term, "*taken sanctuary*" under the protection of an abbot. Geoffrey takes the latter view of the passage, but mistaking the word, makes the boys take refuge in the Church of St. Amphibalus. Gildas's contemporary, St. German of Paris, uses "*amphibalum*" for a chasuble.

entered a church and slain before the altar two royal youths who had taken refuge there. Geoffrey makes these out to have been the two sons of Arthur's nephew and enemy, Modred. It is possible, but one likes not the security. They may just as well have been his rivals in the Damnonian throne, not in the Gwledig-ship. Anyhow, Gildas considers this to be highly reprehensible conduct and says so. He has also a very poor opinion of his morals in other respects. But there is good reason to think that he is the Constantine who was converted to a better life by St. Petrock, to whose hermitage he was led by a stag. The saint protected the stag. Constantine, who evidently did not take much stock in saints, threatened him with his sword, and, as in the better known cases of St. Hubert and St. Eustace, got the worst of it. He was so frightened that he gave up his kingdom, and established himself in a hermitage close to St. Petrock. As Padstow was "Petrockstow," and Little Petherick is also called after St. Petrock, the ruined church and buried well of St. Constantine hard by, in St. Merryn, are probably on the site of that hermitage. Later, Constantine went wandering to Wales, Ireland and Scotland, where he visited St. Columba at Iona and St. Kentigern at Glasgow, and eventually was killed by pirates in Kintyre. A fairly consistent life of him may be worked out from Welsh, Cornish, Scottish and Irish sources, independent lives of saints apparently written without any collusion.

After Constantine the pedigree of our royal house becomes obscure, but we may safely assume that the Gerrans to whom St. Teilo ministered, and the Gerontius to whom St. Aldhelm addresses scoldings about his way of keeping Easter, the way his clergy cut their hair, and his generally rude behaviour towards those who differed from him in such important matters, were both direct descendants of Geraint the son of Erbin, and that the Doniert who was drowned in 875 and the Condor of the Norman Conquest period were of the same family.

I admit that it is pure conjecture, but I think it is not improbable that the Romanised Britons or Britonised Romans of the House of Cystennin Gorneu acquired the sovereignty of Damnonia after they had been pushed westward by the Saxon invaders, and that they dispossessed a line of native Cornish kings or chiefs. The Cystennin dynasty consisted of Christian kings, who were nearly related to the Saint families and were evidently influenced by the Irish and British religious revival of the late 5th and early 6th centuries. Such Latin names as Constantine, Gerontius (though of course that is originally Greek), Ambrosius and others among the earlier ones are evidence of Romanisation. We do not know what these native kings were, but they may have been Christians of sorts too, with, like Vortigern, Modred, and others, a tendency to revert to paganism, when too much observance of the ethics of Christianity was expected of them. The Teudar, who comes into the lives of St. Ia, St. Gwinear, St. Petrock and St. Kea, and is alluded to elsewhere, was a king in Cornwall, and does not appear to be related to the House of Cystennin. He is called a pagan, but his name, which is "Theodore," seems to be Christian. We have not heard his side of the story, for all the accounts of him come from the Irish and other missionaries, whom he is said to have persecuted; but it may be that he only resented the establishment of Irish settlements in his dominions, which might result in annexation, and discouraged them by the simple methods of the period. He had a castle at Riviere or Rovier in Phillack, probably now buried under the drifting sands of the towans. There was another, from which he seriously annoyed St. Kea, at Goodern in Kea. A third was in St. Keverne and is still called after his name "Lestowder," the Court of Teudar. The evidence of place-names, as well as his appearance in several different and unconnected Lives of Saints, seems to establish his existence. It was recently pointed out to me by Prof. Loth that in the same parish as Lestowder there is a place mentioned in the boundaries given

in a charter of the Anglo-Saxon period, but as yet unidentified in a modern form, called "Hryteselt." The present form would probably be "Rejesols." It can only mean the "Ford of Ysolt," no doubt the wife of King Mark, who was probably a later king of the native dynasty. Probably Carnmarth, which was earlier "Carmargh," and Kilmarth, in Tywardreath, close to Lantine, in Golant, which M. Loth has shown to be the "Lancien" of the Tristan story, are called after him. Then there was Gorlois, the husband of Igraine, the mother of Arthur. He does not come into any genealogies of the House of Cystennin, and is not treated with much consideration by that House. His name seems to come into "Bosworlas" in St. Just, "Treworlas" in Breage, and another "Treworlas" in Philleigh, and that of his faithless wife, whose story of enchantment is a little too thin to be convincing, may come into the name of "Bosigron," the Dwelling of Igraine, in Zennor. Probably these kings continued as vassals under the dynasty of Damnonia, and were not highly esteemed by them, and this may account for the disparaging remarks used towards the native Cornish and their kings in the romances of the Arthurian cycle, the distant originals of which were perhaps written in the interests of the conquerors.

The name of Arthur himself, except in names that are obviously borrowed from the romances, does not seem to come into Cornish place-names. But Arthur, though one of the House of Cystennin, was never himself king of Damnonia, but Emperor or War-lord ("dux bellorum," as Nennius calls him) of all the Britons. In a paper in the last number of the Journal of the Royal Institution of Cornwall, I have given what appear to me to be reasons for thinking that the names in a small district in Buryan and Paul, where there is actually a popular, non-literary tradition of a battle of Arthur, said to have been against the "Danes," are in many cases compounded with the names of persons alleged to have been connected with him, and especially with his last battle, Modred, Gawain, Urien, Morgant, Cynwyl, Owain, Bedwyr, and the rest.

I have kept you a long time, and as yet have not got much beyond the names of parishes. The rest must be compressed into a small space, and I will merely indicate directions in which researches may well be made.

Though manors and tenements have many generic prefixes, "Tre" or "Trev," "Lan," "Bos," "Ty" or "Chy," "Les," and many more, by far the most common are "Tre" or "Trev" and "Lan." And of these it may be roughly stated that "Tre" signifies generally a secular and "Lan" a religious establishment. The "Tres" are innumerable, no doubt because the prefix continued to be used for new tenements long after new Celtic monastic foundations ceased to be formed. But in merely going carelessly through that not very exhaustive work, the Post Office Directory for Cornwall, I made a list of about 130 names of tenements with "Lan," besides those of the 22 parishes in whose names "Lan," or a corrupted or contracted form of it, occurs. Some of these "Lans" have non-personal epithets, and in some cases the word may be used in its original sense of an enclosure of any sort, as in the word "Corlan," a sheep-fold. But in the majority of them the epithet is a personal name, and in most instances it is probably the name of the "saint" or Celtic missionary monk who founded the "Lan." Sometime the name is a known one, thus, "Lanheaverne" is certainly St. Keverne's Lan, "Lantewy," in St. Neots, is very likely to be that of "Dewy," as the Welsh call St. David.* "Lanmenver" in Budock, was possibly a lesser foundation of St. Minver, whose principal place was across the river from Padstow. But often the name still remains to be identified, though it clearly is a name. It is

* He also gives his name to "Davidstow," which adjoins "Altarnun," the Altar of St. Nun, his mother, which on the other side comes very close to "Trewen," perhaps called after his aunt St. Gwen. "Trethevey," which Leland calls "Tredewy," between Boscastle and Tintagel, may also include his name. "Davidstow" at one period of English would be a very fair translation of "Landewy," or "Lanthewy," as the more correct form would be.

very probable that nearly all, perhaps actually all, of the "Lan" names go back to the 8th or 9th century at least.

With the "Tre" names it is different. Many of them are quite as early as the "Lan" names, and represent contemporary secular settlements, but such names went on being formed as long as Cornish was spoken, and they may be of any date from the 6th to the 17th century. "Tre" or "Trev" means a "town," and is used in the Cornish and old English sense of that word.* "Les," a Court, is also fairly common, and is generally followed by a personal name. "Lescadjock" or "Lescudjack," on the hill close to Penzance station, is a fort which may have been named after St. Cadoc, who certainly is recorded to have come to the Mount. "Bos," a dwelling, "Ty" or "Chy," a house, are often found with personal names. Down to the Norman Conquest personal names in Cornwall were very varied, and generally Celtic, just as in England they were generally Anglo-Saxon. It was after that time in both countries that the fashion for common saint-names and king-names came in, and the growth of surnames made variety in Christian names less important, and so Marys, Johns, Edwards, Henrys, Williams and the rest came in and swamped the native names. The names that came in then are rare in Cornish places names, which at once puts them back fairly early.

The castles and hill forts, "Cars," "Duns" and "Dinases," may also yield some results. There are very many names beginning with "Car," which is normally the equivalent of the Latin "castra," and the English form of it, "chester," and its translation "bury," "borough" or "burgh," though in some

* That is to say a homestead or farm with its outbuildings, labourers' cottages, dwellinghouse, etc. The English place-name equivalent is "ton" or "ham" or the Anglo-Danish "by." It is the equivalent of the Latin "villa," which in French (in the form "ville") has changed its meaning exactly as the English word "town" has done so. The modern English word "villa" is borrowed from Italian, where the old Latin meaning has remained.

cases it is used, as in Brittany, where it is almost as common as "Tre" in Cornwall, to signify a "town."* But over and over again the fortress is still to be traced, and the name must have history behind it, if we only knew it. Go in imagination a few miles to the northward, and a little to the east of the Falmouth and Truro road, in the parish of Kea, you will find a place called "Carlyon," from which an ancient and honoured Cornish family derives its name. There must be a lot of history behind that name. The early form of it is "Carlyghon," and there is no doubt whatever that, like the name of Caerleon on Usk and the Welsh name of Chester, "Caerlleon," it is "Castra Legionum," the Camp of the Legions. What legions? When did any legions encamp there? There is no answer to this conundrum as yet, but there may be some day. At any rate it is very likely that it is the place that the romance-writer had in his mind, when he made Sir Tristan start for Brittany from a haven called "Carlioun":

"The haven he gan out fare,
It hight Carlioun,"

as Thomas the Rhymer of Ercildoune has it.

It is probable that after the withdrawal of the Roman legions, the British "Gwledigs" or Emperors, who were elected in imitation of the Roman Emperors, kept up an imitation of the Roman state, at any rate for a while. Their title was the exact equivalent, for the Welsh verb "gwledychu" is exactly the Latin "imperare," to have supreme command. Several allusions in early Welsh poems to the "Gosgordd" or retinue of 300 horse, who accompanied the "Gwledig," the actual body of cavalry attached to a Roman legion, seem to point that way, and from other details we may infer that some of the imperial state was kept up. Perhaps the legions whose camp this was were those

* It is used by itself for "town," in the modern English sense, in Breton.

of a post-Roman "Gwledig," it might be Ambrosius or Arthur. Nennius tells us that the ninth battle of Arthur was at "the City of the Legions which is called Cair Lion." Curiously, the tenth was at "Trat Treuroit." In 500, according to Ethelwerd, Cerdic and his son Cynric sailed all round the western part of Britain. Did they land in Cornwall, and did Arthur fight them at Carlyon, and then drive them northward to "Treath Truro," the strand of Truro, and beat them there again?

One more historical conundrum. I wish some one could tell me who "Gwrgi," or "Wurgi," was. It may have been a common name. There is a case of it among the Bodmin man-missions, where Wurci, son of Ourdylic, was set free at the Altar of St. Petrock by Grateant, a master who also bore a Celtic name. It literally means "the man-dog" or perhaps "the male dog," for "gourgath" in Cornish certainly means a tom-cat. In modern Welsh it means a "cannibal," perhaps from the most notorious person of the name in Welsh literature. Celtic names compounded with "ci" or in Gaelic "cu," dog, are very common. But if the places in Cornwall which include this name all belonged to the same man, he must have been of some importance. There is a "Bosworgy," the Dwelling of Gwrgi, in St. Columb Major; "Carworgy," the Fort of Gwrgi, "Ennisworgy," the Island of Gwrgi, and "Killiworgy," the Grove of Gwrgi, are also in St. Columb. There is another "Bosworgy" in St. Erith, and I have found seven cases of "Treworgy," the Town of Gwrgi, in St. Cleer, Duloe, St. Genys, Liskeard, Probus, Redruth, and Ruan Lanyhorne, and there may be others. Also there is "Poltreworgy," the Pool of the Town of Gwrgi, in St. Kew. Yet history is silent about him. There are Gwrgis who come into Welsh history and romance. Gwrgi Gwastra was one of the hostages given by Pryderi ap Pwyll to Math ap Mathonwy and Gwydion ap Don. There was Gwrgi the son of Elifer Gosgorddfawr, and brother of Peredur of the North, who was

killed in 580. His grave, say the "Englynion y Beddan," the Stanzas of the Graves, is among the long graves in Gwanas. Arthur goes to the West of Ireland to seek for Gwrgi Severi for the hunting of the Boar Trwyth in the Tale of Kulhwch and Olwen. From the context this Gwrgi seems to be a dog. There was a Breton Gourguy, the son of Galon of Trémazan, a place to the north west of Brest. After a stormy career he came under the influence of St. Paul of Léon, was converted, became a saint (monk) and changed his name to Tanguy.* His later name is the origin of the Cornish name "Tangye." There was a rather obscure Welsh saint of the name; and there was another, Gwrgi Garwlwyd, who though an eminent Sabbatarian, with a remarkable reverence for the Lord's Day, was not exactly entitled to be called a saint. He, according to a Welsh triad, was one of the three arch-traitors of the Island of Britain, the other two being Modred and Aeddan of the North. At the court of the Saxon king Ethelfled he acquired a taste for human flesh, and when he returned to Wales he would eat no other meat. He was accustomed to kill every day a youth or a maiden of the Cymry for his own eating; "but he killed two on Saturdays, that he might not have to kill one on Sunday" ("a dwy bob Sadwrn, rhag llad y Sul yr un."). Let us hope that he was not the Cornish Gwrgi.

The names of Cornish fields bring us to a very late period of history. They are for the most part very modern, and tell us something about the transitional period of the languages. I have recently been examining the Tithe Apportionments of two Cornish parishes, Breage and St. Keverne. The field-names in both of these are mostly English, which probably means that

* See "Buez an Aotrou Sant Paul, Eskop Leon, tennet euz al levrion koz, gant an Aotrou Kerne" [Life of Monsieur Saint Pol, Bishop of Léon, extracted from old books, by Monsieur Kerné, curé of St. Joseph's Church, in St. Pol de Léon], Brest, 1893.

enclosure in those parishes was late. But there are a very fair number of Cornish names, and, what is still more noteworthy, there are several names of mixed Cornish and English, Cornish nouns with English adjectives put in Cornish fashion after the noun, and I think that by a study of these we may learn something about the gradual breaking down of Cornish.

To conclude, I think I have said enough to show that a careful and intelligent study of Cornish place-names, especially when considered as to their geographical distribution, and combined with an equally careful study of the Lives of Celtic Saints, the Welsh triads, genealogies, chronicles, tales and poems, and the mediæval romances of the Arthurian Cycle, may produce some surprising results. One result, perhaps the most surprising of all to many people, will be, I think, to discover that the Welsh bards, chroniclers and genealogists, and the monkish writers of Lives of Saints, though occasionally imaginative, were not such habitual liars as it has hitherto been the fashion to think them. There are many sources of information of varying trustworthiness, and an immense amount of material has recently been collected together in a book the concluding volume of which will be out before very long, "The Lives of the British Saints," by the Revs. S. Baring Gould and John Fisher. Though one need not accept all the conclusions and conjectures in this work, for at present no two of us are likely to agree in our conjectures, there are any amount of references to authorities, which one can look up for oneself.

At present the subject is largely in the conjecture stage. I have used, perhaps until you are tired of it, such words as "probably," "possibly," "perhaps," and "it seems," and have seldom ventured to assert anything with certainty. It looks as if I was not certain about anything. That is substantially true. I am not; or at any rate not about many things on this subject. It is with much diffidence that I put forward my tentative

theories in the presence of one of the most distinguished historians of the day,* theories, too, which relate to the period of history which he has made so particularly his own. But he will, I am sure, make allowances for the fact that whereas his history is largely derived from nice civilised Greek and Latin writers, who attended to their spelling, minded their stops, were careful about their grammar, and took some trouble to get their names and dates right, I have been engaged in hunting elusive ghosts, who play hide-and-seek in the Celtic twilight among the volumes of the *Acta Sanctorum*, or in the tangled jungle of Welsh literature, to be run down, if at all, among the sheets of the 6-inch Ordnance Survey. In the present state of our knowledge so much must needs be a matter of conjecture, that, as far as I can see, our only possible process is to go on setting up conjectures and knocking them down again, until we find some which will stand upright, whatever we do to them.

* I leave the passage as I spoke it in his presence, though since the delivery of this lecture, that great, good and learned man, Thomas Hodgkin, has been taken from us. *Requiem æternam donet ei Dominus.*



Report of the Conference of Delegates of Corresponding Societies of the British Association.

*Held at Dundee, September 5 and 10, 1912.**

<i>Chairman</i>	.	.	.	.	Professor F. O. Bower.
<i>Vice-Chairman</i>	.	.	.	.	H. W. T. Wager.
<i>Secretary</i>	.	.	.	.	W. P. D. Stebbing.

FIRST MEETING, *September 5.*

The Chairman, in answer to questions relating to the proper recognition of the Conference, put it to the meeting that the names of the delegates and the subjects of the papers for discussion should be printed in the day's JOURNAL, as was already done in the cases of the Committees of the Sections and the sectional papers. This was approved.

Mr. Oke, the Rev. T. R. R. Stebbing, Mr. Balfour Browne, and Mr. Mark Sykes having spoken on other matters relating to a more thorough recognition of the Conference, it was also agreed that a list of the delegates of the various Societies represented at the British Association meetings, with their attendances, should be printed in the Report of the Conference.

The Secretary read the Report of the Corresponding Societies Committee. It was agreed that a grant of 25*l.* should be applied for at the meeting of the Committee of Recommendations. On the proposal of Dr. J. G. Garson, it was agreed that the Conference should nominate a second representative to attend the

* Inserted with the kind permission of the British Association for the Advancement of Science, from whose Reports this is taken.

Committee. On Mr. Mark Webb's proposal, it was decided that the Secretary should be the second representative. (These motions have since been proved to be out of order, the Rules of the Association only allowing the Conference to nominate one member on the Committee of Recommendations.)

The Chairman then delivered his Address, entitled :—

*The Life and Work of Sir Joseph Hooker, O.M., F.R.S.**

He said that the death of Sir Joseph Hooker, in December 1911, might be held to have been one of the most outstanding events of the year. He did not give any consecutive biographical sketch of this great botanist, but indicated the various lines of activity in which he excelled. He contemplated him as a traveller and geographer, as a geologist, as a morphologist, as an administrator, as a scientific systematist, and, above all, as a philosophical biologist.

As a traveller Sir Joseph visited all the great circumpolar areas of the Southern hemisphere. He spent almost four years in India. He botanised in Palestine and in Morocco, and finally in the Western States of America. The results he worked up into such great publications as 'The Antarctic Flora' and 'The Flora of British India.'

As an administrator Hooker guided for thirty years the destinies of Kew Gardens, and served for five years as President of the Royal Society. As a systematist he co-operated in the Genera Plantarum and the Kew Index. But it was as a philosophical biologist that he rose to the greatest heights. An early friend of Darwin, he was the first to accept his views. In 1859 Darwin himself wrote: 'As yet I know only one believer, but I look at him as of the greatest authority—viz., Hooker.' While Lyell wavered, and Huxley had not yet come in, Hooker was in

* Printed in full in the *Makers of British Botany*, Cambridge University Press, 1912.

1859 a complete adherent to the doctrine of the mutability of species.

This position was confirmed by a masterly series of essays from Hooker's pen. The most notable was the introduction to the 'Flora of Tasmania.' The last was that great address to the Geographical Section of the British Association at York in 1881 on 'The Geographical Distribution of Organic Beings.' It was such works as these which led to the cumulative result that he was universally held to have been the most distinguished botanist of his time.

Sir Edward Brabrook (Balham and District Antiquarian and N.H. Society) proposed, on behalf of the Conference, a vote of thanks to the Chairman. His subject was most appropriate, and was a most eloquent and valuable study. It suitably gave point to the famous opening—Let us now speak of great men.

Professor M. C. Potter (Durham University Philosophical Society), in seconding the vote, thought that the meeting would regard the Address as a most stimulating account of one of the greatest of the great scientific minds of the nineteenth century.

Miss A. Lorrain Smith reported on the results obtained by the British Mycological Society, from the sending out of a circular on certain fungoid pests. She said that, following on a suggestion by Mr. Harold Wager, a committee of the Society had been formed to draw up a series of questions which might afford direction and guidance to members of local Natural History Societies in their study of fungi. It was felt that workers living in the country had many opportunities of making careful observations and collecting specimens which would be of service to research students. The questions submitted had reference mainly to diseases of fruit and forest trees, about which data were urgently desired. The questions were as follows:—

1. The very serious disease known as 'Silver-leaf' (so called because the leaves become of a silvery colour) which

affects fruit-trees, particularly the Victoria plum, is now thought to be caused probably by *Stereum purpureum*, the sporophores of which appear on the dead wood of the affected trees. Observations on the following points would be valuable :

- (a) The distribution of *Stereum purpureum* as a parasite or saprophyte in the district.
 - (b) The habitat, with exact identification of the dead tree, shrub, or wood on which the sporophores are found.
 - (c) Did 'silvery' foliage occur on the tree or shrub previous to the occurrence of the sporophores on the dead wood?
2. Many British trees are greatly injured by the growth of fungi belonging to the Polyporaceæ. Information is wanted as to :—
- (a) The name of the trees affected ; and
 - (b) The name of the Polypore causing the injury.
3. A revision of the British Clavariaceæ is being made by Mr. A. E. Cotton, F.L.S., of The Herbarium, Royal Gardens, Kew, who would be much obliged if members of local Natural History Societies would forward to him at the above address specimens of this order for identification and examination.

The committee of her Society also asked the secretaries of the local Natural History Societies to inform them as to the number of their members interested in the study of mycology, and if any lists of fungi or papers thereon had been published by them. The questions were sent to over 100 secretaries of societies. Miss Smith was disappointed to record that so far only four had acknowledged them. No further response had been received, although the subjects on which information was needed were not minute in size. She explained, however, that the fungus season

was over before the circular was issued, and that possibly the subject would be taken up in the coming autumn months.

As a result of the discussion the delegates present undertook to lay the matter before their societies, and, so far as possible, to induce their members to co-operate with the British Mycological Society.

Mr. H. N. Davies (Somersetshire Archæological and Natural History Society) asked that copies of the questions should be sent to delegates as well as to the secretaries of the societies. His society seemed not to have received the paper, and he wondered if those which were not exclusively Natural History Societies had been overlooked.

Mr. Harold Wager thought the questions put by the British Mycological Society were very suitable for investigation by the local societies, and he hoped that the delegates present would be able to induce their members to take up these and similar problems for investigation. As showing what valuable work can be done, it is worthy of notice that the Mycological Committee of the Yorkshire Naturalists' Union has during the last twenty-seven years published no less than 178 reports, papers, and notes on British fungi, especially on those found in Yorkshire, and has recorded nearly three thousand species (2,895 up to March 1912) from the county, of which a considerable number are new to Britain, and many of them new to science. The published papers and reports deal mainly with the systematic determination of species, but papers on economic topics, and on the structure and life-histories of fungi, are also included. In addition, a bibliography of fungi of the North of England, and a valuable and well-arranged fungus flora of Yorkshire have also been published. There can be no doubt that substantial additions to our knowledge of fungi and of problems connected with them can be made by local societies, and it is hoped that the suggestions brought forward by Miss Lorrain Smith will not be lost

sight of by the societies represented at this Conference, the members of which, he felt sure, are all anxious to do some real work for the advancement of science.

Sir George Fordham (Hertfordshire N.H. Society and Field Club) wished to deal with a larger question than that specifically dealt with by the communication. He pointed out that certain plant diseases—the American Gooseberry Mildew in particular—were obtaining a very serious and destructive prevalence, and were being dealt with by the local authorities under orders made by the Board of Agriculture and Fisheries, and he thought it was very evident that more and more of such diseases as are injurious to agriculture would be scheduled. Of course, for such work expert officials exist, and others will be appointed and paid, but he considered it of great importance that public opinion and public knowledge should be cultivated extensively, and that investigations as to the extent of the prevalence of injurious diseases of this character should also be carried on by local societies. Such action would be welcomed by County Councils and otherwise would be of great assistance in dealing with diseases and insect pests.

The delegates of the Glasgow N.H. Society and the Perthshire Society of Natural Science and the Chairman also joined in the discussion.

The State Protection of Wild Plants.

Mr. A. R. Horwood (Leicester Museum) submitted the following preliminary report of the Selborne Society's Committee for considering this subject. In Mr. Horwood's absence the Report was read by the Secretary.

From time to time efforts have been made to draw attention to the necessity of protecting and preserving our native flora. At the present time, however, the energy spent upon the question is entirely inadequate, and the results so far have not been commensurate with the efforts put forth. It is the object of this

communication to report progress and to make a further appeal for help and co-operation.

The Selborne Society, whose object has always been to preserve Nature in all aspects, has recently established a section of which Dr. A. B. Rendle is chairman, and the writer recorder. This small association so far represents the only organised body endeavouring to bring about State protection. Professor G. S. Boulger, a member of this section, who was instrumental in forming it, has a draft of the Bill it is intended to introduce already framed.

The section has endeavoured to forward this national question in three principal ways :—

1. By educating the public as to its need (by leaflets, notices, articles, &c.).
2. By obtaining co-operation in the prevention of destructive agencies.
3. By endeavouring to obtain permanent interest and help in all parts of the country for the canvassing of all sections of the public at the right moment to make an appeal that cannot be put aside.

By aid of the County Councils the schools of this country have each received leaflets and cards deprecating wholesale extirpation of wild flowers, and suggesting the proper way and time to collect them.

It is now proposed to obtain the assistance of County Councils in the framing of bye-laws preventing hawking, &c., along highways in every county. The Rural District Councils are asked also to prevent the evil effects of road trimming and scraping upon wayside flowers, if only from the æsthetic standpoint. The secretaries of scientific societies and associations are asked to form a local branch by appointing corresponding secretaries to keep the section in touch with local needs, and to afford all the help that such a widely organised basis for

propaganda supplies. This appeal in advance will reach many to whom otherwise the section would not have had access.

The Rev. F. Smith (Prehistoric Society of East Anglia) affirmed that nurserymen and people who traffic in rare specimens and varieties are the great exterminators of plants in many localities. Cases of the kind had come to his notice during the past thirty-five years in Scotland. He considered that the British Association should make a point of helping in the protection of wild plants. He also felt that school children ought not to be sent around the country to collect plants to be used in their schools—a procedure too common with teachers.

Mr. Wilson L. Fox (Royal Cornwall Polytechnic Society) supported the observations of the previous speaker. He mentioned that in a book by the Rev. C. A. Johns, entitled 'A Week at the Lizard' the *habitat* of several rare plants and ferns is mentioned, of which that district is now practically depleted, owing to the ravages of local dealers. He had heard of hampers of more or less rarities having been sent off to collectors and others, for which sums of as much as 5*l.* had been paid for one consignment. As an instance, the Royal Fern (*Osmunda regalis*), once common in many valleys in Cornwall, is now seldom met with except in private grounds. In this way the Cornish chough has become practically extinct, through the eggs being sold, he had been informed, for 1*l.* or more apiece, notwithstanding that it is protected under the Wild Birds Protection Act. He feared legislation, though it might be useful to a certain extent, was not a sufficient deterrent in cases where rare specimens could command a commercial value. An efficient remedy was needed. He suggested that perhaps the most effectual one would be to have plant and fern sanctuaries, or at least, gardens set apart in different localities, where under proper cultivation and suitable conditions every rare British species might be preserved in one situation or another to prevent its extermination.

Mr. E. A. Martin (South-Eastern Union of Scientific Societies) said that the question as to the means to be taken to preserve plants would require careful consideration. He was strongly opposed to parliamentary action. Laws were not made to manufacture criminals, and to think that children who gathered amongst common flowers a few rarer ones should come under the purview of the law was abhorrent. At the same time he thought that greater care should be taken by those in charge of children to prevent plants from being promiscuously uprooted, and where only two or three of a species were found none should be plucked. An Act of Parliament would do little good and much harm. What was wanted was a better feeling amongst teachers toward Nature, and the great remedy is education in that direction.

Mr. R. M. Wilson (for Essex Field Club) supported the remarks made as to the extirpation of plants, and gave as an illustration meeting a man on Ben More, in Perthshire, carrying a hamper of rare ferns gathered in the vicinity. These ferns he proposed sending to a nurseryman in Glasgow to whom he had sent other consignments, and for which he had received payment, and produced a postal order for 15s. This man had Moore's book on British Ferns, and visited all the localities specified therein in his search.

Mrs. White (School Nature-Study Union) said that her Society had a membership of fifteen hundred teachers, and that the committee of her Society had already considered this subject. They were doing all they could to impress upon teachers the necessity of teaching Nature-study with the least possible destruction of the common flowers and with the complete preservation of the rarer plants.

At a later point in the discussion on this subject, Mrs. White suggested the insertion of an article, putting forward the views of the Conference of Delegates, in the Journal of the Union. This was published five times yearly, and was edited by Miss

von Wyss, of the London Day Training College. It would reach about two thousand teachers. The meeting being in agreement with the suggestion, Mrs. White, on being applied to, said that she would be pleased to send an article on the lines suggested for insertion in the Journal.

Mr. H. N. Davies (Somersetshire Archæological and Natural History Society) said that flowers which had almost totally disappeared were the Single Pæony from the Steep Holm in the Bristol Channel, and the Cheddar Pink and *Lithospermum caruleum* from the Cheddar Cliffs and the Mendips. Lovers of wild flowers are guilty of collecting these rare plants and planting them in their gardens, and some nurserymen are verily guilty of transplanting them and cultivating them for sale. It is a difficult question whether rare plants and their localities should be brought prominently before children, as it might stimulate them to mischief.

After some further discussion, it was proposed by Mr. H. D. Acland (Royal Institution of Cornwall), and seconded by Sir George Fordham: 'That this Conference of Delegates from the Affiliated and Associated Societies requests the Council of the British Association to consider what would be the best means of preventing the extinction of rare animals, birds, fishes, and plants in the United Kingdom, and to take such steps as they consider best.'

The Chairman remarked, in conclusion, that the discussion amply justified the existence of such a Conference as the present. He doubted whether by any direct action or by legislation any effective check could be imposed. He saw in education the best preventive. Rarity does not make a specimen more effective as a medium for teaching. He had taught more students on specimens of *Caltha palustris* than on any other species. He was heartily in agreement with the suggestion that a list of *common* species suitable for teaching in schools should be drawn up and

circulated, and so as to divert the attention of pupils and teachers from the rarer plants.

SECOND MEETING, *September 10.*

The first business before the meeting was the movement of a vote of sympathy on the death of the Rev. R. Ashington Bullen, at one time Secretary of the South-Eastern Union of Scientific Societies, and delegate from the Union to the Conference of Delegates. The vote was proposed by the Rev. T. R. R. Stebbing, who bore testimony to the love in which Mr. Bullen was held, and the unobtrusive way in which he did good. His sudden death was a shock to all who had ever had anything to do with him. Mr. E. A. Martin also added a few words of sympathy, referring to the energy Mr. Bullen put into everything he undertook.

Mr. G. Claridge Druce (Ashmolean Natural History Society of Oxfordshire) brought up before the meeting the following resolution, which, as amended, ran:—‘That this meeting of delegates cordially approve of the objects of the Society recently established for the purpose of obtaining areas containing interesting specimens of flora and fauna, and also objects of geological interest.’ Mr. Druce said the resolution was of some importance at that moment, as the Society had commenced operations by acquiring about two thousand acres of shingle and saltings at Blakeney, in Norfolk, the breeding-ground and *habitat* of many interesting species of birds and plants. It was the intention eventually to hand over the area to the National Trust.

Mr. A. H. Garstang (Southport Literary and Philosophical Society), speaking on the resolution, said that Canon Rawnsley suggested the formation of a Government department or the appointment of a Government official whose province it should be to generally superintend the preservation of places such as the National Trust was formed to protect, and to whom the Trust could appeal in case of emergency to veto its conversion to

purely commercial uses without adequate restrictions. As the kind of places this proposal might have in view might naturally include those reserved for the preservation of local fauna and plant life, his suggestion was, that if any such proposal took shape, the delegates might exert a powerful influence in supporting it.

Mr. W. Whitaker (Essex Field Club), in the absence of Sir Daniel Morris, seconded the resolution, which was carried unanimously.

Mr. H. N. Davies, speaking as a delegate for the first time, put forward the following suggestions as to means of making the Conferences of greater use:—

1. The provision of a lounge where delegates might meet each other, and compare notes and so obtain mutual help.

2. Each delegate to bring a copy of the annual volume of his Society to be placed on the lounge-room table.

3. Each delegate to be furnished with the agenda of the meeting a day or two before it takes place.

4. A social gathering of delegates (supper, *conversazione*, &c.) to be a feature of the annual meeting of the British Association.

5. Any other means which can be suggested to make the Conferences really helpful.

The above proposals led to a lively discussion, during which it was pointed out that the Conference stood on altogether a different plane from the Sections; that every delegate was largely interested in one or other of the Sections; that the time of the members during the week of the meeting was already fully occupied; and that as the delegates were all members of the Association they could not expect special advantages in the way of rooms which other members of the Association had not got. The matter was also carried a step further by Mr. Whitaker pointing out that any changes in the arrangements of

the Conference could only be brought before the Council through the Corresponding Societies Committee, on which sat as *ex-officio* members the President and officers of the Association. Mr. A. H. Garstang thereupon proposed:—‘That it be a recommendation to the Corresponding Societies Committee to form a committee of the delegates themselves to discuss during the provincial meetings questions of administration and the proper application of their energies which suggest themselves during the meetings of the Conference.’ This was seconded and carried.

Mr. Harold Peake (Anthropological Section) brought the following matters before the Conference from the committee of his Section:—

1. That material illustrating the folk-lore of the British Isles was much desired, especially from the Scotch districts. All information on this subject to be addressed to Miss Charlotte Burne, c/o The Folk-Lore Society (5 Terrace Gardens, Kensington, London, W.).

2. Evidence was also required as to the distribution throughout the British Isles of implements dating from the early part of the Bronze Age, especially flat celts. Information on this subject to be sent to Mr. Peake, Westbrook House, Newbury.

Through the kindness of the Selborne Society Mr. Wilfred Mark Webb read the following paper, which was illustrated by a series of slides from photographs taken in the sanctuary.

The Brent Valley Bird Sanctuary—An Experiment in Bird Protection By WILFRED MARK WEBB, F.L.S., F.R.M.S.,
Honorary Secretary of the Selborne Society.

The difficulties of administering the Wild Birds Protection Act are well known, but it is possible for individuals and societies with a little trouble to do something towards preserving birds, and it is an experiment in this direction which I am going to describe.

Some eight or nine years ago, it was suggested at a committee meeting of the Brent Valley branch of the Selborne Society that some steps might be taken to protect the nightingales which were known to nest in a wood of about nineteen acres lying between Ealing and Harrow, which comes within the boundary of the London Postal District. A small sub-committee of three members, of whom I happened to be one, was appointed to make arrangements, if possible, for the wood to be watched in the nesting season.

As a result, it became part of the duties of a farm-hand to attend to warn off bird-catchers and bird's-nesting boys. After a year, however, the committee took over the wood, employed a watcher of their own, and kept up the hedges with their own hands. But though success was attained in other directions, the nightingales were not heard for several seasons—in fact, not until the appointment of the present keeper, who is engaged all the year round, and takes a particular interest in his work.

I may say now that the wood is composed of oak trees, with coppice below, chiefly consisting of hazels, though there are many other trees and shrubs represented, and these have grown to a considerable size in places that have not been regularly cut for many years.

Among the common birds that build as a rule are the song-thrush, missel-thrush, blackbird, and hedge-sparrow, but there are often special points of interest concerning even them with regard, for instance, to the material of the nests, its position, and variations of the eggs.

As a rule, too, from the beginning there have been each year a chiffchaff's nest and several willow-warblers'. The garden-warbler and whitethroat always breed, and now does the lesser whitethroat, while the turtle dove builds every year. We have only once followed the development of the young cuckoo, though the eggs were found in the wood before it was protected. We

have had on one occasion a wild duck's nest, but the parent birds were most probably shot outside the confines of the wood.

The long-tailed tit at one time was common, and it is almost the only bird that has not increased its numbers. The wren is numerous, and builds in the open or under cover in empty tins or old kettles which may or may not have been put up for the purpose. The robin is another bird which has the habit of making its nest sometimes in natural and sometimes in artificial surroundings.

It is noticeable, however, that with the exception of an occasional pair of blue-tits, one of which nested in a hollow branch, none of the birds which commonly build in holes, except the two already mentioned, were found to nest. This, no doubt, was owing to the fact that the oak trees in the wood are young and sound.

At the beginning of one season, however, my boy took it into his head to make some rough nesting-boxes with large openings, and that summer nests were recorded of the fly-catcher, the great tit, and the tree-sparrow. Then other boxes were made with various-sized openings, and of more careful construction. These succeeded marvellously well. Blue-tits and coal-tits built, the tree-sparrows and great tits increased in number, and the wrens and robins made use of the boxes as well as of the tins and kettles. The nuthatch made its appearance, and has been a resident in the wood ever since. Experiments were also made in the way of open boxes for fly-catchers, while trays for blackbirds and thrushes, which were fastened to the trees, found favour with some birds, in spite of the almost unlimited possibilities for their building in the undergrowth. Some of the visitors, whom we admitted sparingly in those days, asked us to make nesting boxes for them. The reputation of these dwellings spread, and as we were only too anxious to retain the services of our custodian we were glad to be able to keep him busy in the winter, and the

profits on the boxes went towards the expenses of the wood. It soon became evident that improvements could be made in the nesting boxes. For gardens also it might be advisable to have something a little less artificial-looking. The only boxes on the market made from natural logs with which we were acquainted were those designed by Baron Berlepsch.

To these we found several objections:—

(1) First of all, they were manufactured in Germany.

(2) The idea of making them harmonise with their surroundings was not carried through, because there was a piece of ordinary wood screwed on the top of the log.

(3) The lid could not be lifted off at any time for the contents to be examined, and considerable trouble had to be spent in unscrewing it in order to clean out the boxes at the end of the season.

(4) The inside, which was cut out very carefully to imitate the hole bored by a woodpecker, did not provide much room in the smaller-sized boxes for large broods, and all the trouble was thrown away in the case of all those which were fastened low down on the trees for the smaller birds. I therefore spent some amount of time and trouble with the help of a member who has a joinery works in producing boxes suited to our requirements, and these have been very successful. We made very rigorous tests last year, with which we were quite satisfied.

We find also that the opening of the box at the top instead of at the front does not disturb the birds if they happen to be sitting. A great deal more pleasure is therefore given to those who put up the boxes. The eggs and young can also be seen more easily, and quite good Nature-study observations can be made, in which case even the commonest birds are useful.

We have not forgotten that birds like the woodpecker and the wryneck make no nest, and if their eggs are to be kept together for hatching a flat-bottomed box is useless. The bottoms of all

the boxes are slightly curved, but special cup-shaped bases are put into those which are fastened high in the trees. We make special large openings for robins, and restrict the size where only birds useful to the gardener are to be encouraged. It is useful to bear in mind that the common sparrow and starling seldom build low down.

I might call attention to the fact that a small series of boxes is on view in the Zoological collection arranged at this meeting of the British Association, Section D (Zoology).

In addition to the birds that nest, we have a number that always seem to be present, but whose eggs we have not found. The list includes three species of woodpecker, and the brown owl, which up to the present has refused all the nesting sites put up for its benefit. The barn-owl is often to be seen, as is the golden-crested wren. The nightjar has been present during three seasons, the king-fisher is a common visitor, and jays and magpies occasionally appear.

Snipe sometimes frequent the outskirts of the wood, and on one occasion I found a dead woodcock within its boundary. This bird my wife had apparently seen alive a few days previously. Recent records include the breeding of the goldfinch, redpoll, marsh-tit, and wryneck.

It will be noted, however, that very few of these birds are really rare, but it is the object of the committee to protect those which occur near London. In the Brent Valley there are few crops that the birds are likely to damage, but in other localities it might have to be borne in mind when doing similar work that certain species should not be unduly encouraged, or, indeed, given protection.

It is practically impossible to describe all the pleasure that can be obtained from such a reserve. It is a source of interest all the year round, and the mammals, reptiles, insects, and other creatures should be taken into consideration. The mice are

somewhat destructive to eggs, but the way in which they utilise old birds' nests is worthy of attention. The fungi may be mentioned, and a bird reserve also becomes a sanctuary for flowering plants. Steps will be taken to form committees in other parts of the country, and I should be very pleased to give any advice that I can to those who are thinking of protecting any definite areas in the way which has been outlined.

Mr. A. Newlands (Inverness Scientific Society and Field Club) afterwards read a valuable technical paper, of which the following is an abstract :—

Water Power and Industrial Development in the Scottish Highlands.

Its high mountain ranges, its lochs fed from large drainage areas, its rainfall ranging from sixty to one hundred inches per annum on the high altitudes, and its steep and rapid rivers are the natural features of the Highlands of Scotland which give to that region a character unique in the British Isles. It is these characteristics which pre-eminently mark it out as possessing possibilities for hydro-electric development nowhere else available in Great Britain.

Further, it has the advantage, from the standpoint of transport facilities, of possessing an indented and well-sheltered coastline, and it is well served by good roads and railways. Its climate is equable, and it has sturdy and industrious country populations available for any industrial development. A start has been made at Kinlochleven and Foyers, where the British Aluminium Company already generates 30,000 and 7,000 horse-power respectively, and there are many smaller installations.

The accompanying map—in no sense complete—shows the processes available from certain drainage areas, it being contended that only by developing the energy available from each drainage drill, and generating current of the same periodicity in



each of them so that they can be linked up and can feed each other as required, that maximum efficiency and economy can be attained.

The present-day method of generating electric energy in bulk in power-stations and of distributing and selling it over a wide area as required opens up tremendous possibilities for areas similar to the Highlands, and development of such areas is rapidly taking place all over the world.

The congestion consequent upon the centralisation of industry and the increasing cost of coal as a source of power are both to-day providing the stimulus for hydro-electric development.

Our infant industries were all planted and grew up round the steam-engine, which had its birth 120 years ago. Owing to their dependence on coal, the districts where it was available became our great industrial centres, particularly if sea or other transport facilities were also there available.

With the growth of industry these centres became increasingly congested until to-day this congestion is largely responsible for the unrest and expense which is so marked a feature of our industrial life.

Decentralisation or an industrial development in rural or country districts is the most probable solution, and regions like the Highlands of Scotland possessed of possibilities for cheap power and convenient transport facilities to and from a world-wide market have first claim on any such development. These Highland water powers are estimated at one million horse-power in amount, but if the figure be put at 500,000 horse-power, it is equivalent to the power which could be generated from three and a half million tons of coal, which at 10s. per ton represents a yearly value of 1,750,000*l*. These powers should be looked upon as a national asset, and should be developed by Government assistance and control, on the same lines as light-railway projects and other works for the public benefit are assisted.

In this way the lean years which would have to be faced until the power demand grew to an extent sufficient to pay interest on capital would be tided over and success then assured, for it is an axiom in all hydro-electric schemes that the power demand is never stationary but goes on increasing year by year.

In addition to the previous business there was also before the meeting a proposal by Dr. A. Loir, of Havre (Delegate to the British Association from the French Association meeting at Havre in 1914), regarding a meeting of the Conference of Delegates at Havre in 1914 on the occasion of the meeting of the British Association in Australia. The proposal was favourably received, and it was decided that it should be officially discussed at the meeting of the Conference at Birmingham during the ensuing year.

The Conference closed with votes of thanks to the readers of the papers and to the Chairman for presiding.

Catalogue of the more important Papers, especially those referring to Local Scientific Investigations, published by the Corresponding Societies during the year ending May 31, 1912.

* * This Catalogue contains only the titles of papers published in the volumes or parts of the publications of the Corresponding Societies sent to the Secretary of the Committee in accordance with Rule 2.

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Reviews.

Observations on the West of England Mining Region by J. H. COLLINS. Cloth Demy 8vo., 700 pp. with many illustrations. Published by the Author. Price 21/-.

THIS work consists of two distinct parts, namely, a treatise on the ore-deposits of the West of England, and a very complete descriptive summary of the mineral output of the region by districts, lodes, and individual mines. These two parts are not however kept entirely separate. Even in the purely descriptive and statistical part of the book, dealing with the history of individual mines and their successive exploitations, the mode of occurrence of the ore-bodies, their probable mode of formation, and other theoretical aspects of the subject are referred to in considerable detail, at the risk of some inevitable repetition, in order to make the description of each case fairly complete from the scientific as well as from the commercial point of view.

It is safe to say that no such complete collection of statistics in regard to the mineral output of the West of England have ever been published, and if some of the estimates both in regard to past production of the mines and mineral contents of the rocks appear at first sight to be somewhat exaggerated, and based in insufficient data, the too critical reader should bear in mind that the author is beyond question the greatest living authority on this, his own subject. As regards his declared optimism this much at least may be said, namely that it was an optimistic spirit in the past which brought to such a prosperous condition the mining industry of the Duchy during the latter half of the eighteenth and first half of the nineteenth centuries,

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whilst it is the conspicuous exhibition of the contrary temperament amongst Cornishmen themselves to-day that is at least one of the principal reasons for the lack of recuperative power so noticeable in the same mining industry of recent years. If there were more Cornishmen of mark as optimistic as the author of this work it is impossible to doubt that outsiders would flock in to follow the lead of those who may be supposed to be more or less acquainted with both the facts and the prospects.

Considered merely as a treatise on the ore-deposits of the district, their mode of occurrence and genesis, apart from a few trifling blemishes, the work is satisfactory in its presentation, and thoroughly covers the ground. The chief criticism which might have been levelled against its exposition of the facts, namely the comparative lack of illustrative references to the somewhat copious American literature of the past decade on the genesis of ore-deposits, is indeed anticipated and disarmed by the author himself in his Preface. Bearing in mind too the author's extensive acquaintance with ore-deposits in foreign countries, the comparative fewness of the references to other mining districts is also, probably, deliberate. It is a matter of common knowledge that Cornwall has been for at least three generations the practical mining school for the entire English speaking world, a majority of underground foremen all over the world, if not themselves Cornish, having learned their business from Cornishmen. It is, therefore, doubly interesting to note that as regards geological observation and speculation Cornwall is also well to the fore, since the phenomena of faulting were exhaustively studied, and all the essential features of the theories of ore-deposition which have been announced during the past two decades, and credited as recent discoveries by the greater part of the scientific world to American and other writers, were held and taught in Cornwall a century ago or more.

The author has well weighed both the records and the speculations of previous writers before presenting his own "observations," which form at once a summarized record and a sound critical digest; the present work will take rank with those of Henwood and De la Beeche as a classic.

Note by the Editor.

I may perhaps be allowed to add a note to this review on the only passage in the book on which I am at all qualified to give an opinion. Mr. Collins (page 49) states, on the authority of the late Robert Hunt, ("British Mining" p. 406-407) that the Cornish mining term "carbona," which signifies a rich accumulation of ore in one place, is of Syro-Chaldaic derivation. This is probably quite true, but the pedigree of the word and its change of meaning are of some interest. The Syriac word ܩܪܒܢܐ (*qurbana*) signifies primarily an offering, a gift, a sacrifice. It is the "emphatic" state of the noun "corban," which occurs in that sense in St. Mark vii., 11. At the present day the Syrian Christians, whether Monophysites, Nestorians or Uniats, use the word for the Sacrifice, *par excellence*, the Holy Eucharist, and ܩܪܒܢܐ ܕܩܪܒܢܐ (*Taksa d'qurbana*), "the Order of the Offering," is the service of what Western Christians would call "the Mass."* But the Aramaic speaking Jews of the beginning of the Christian era called the Treasury of the Temple of Jerusalem ܒܝܬ ܩܪܒܢܐ (*baith qurbana*) "the house of the offering," and, as Hunt points out, St. Matthew in his Gospel (ch. xxvii., 6) uses the Greek transliteration Κορβανᾶς. This is used in this place only instead of the more usual word γαζοφυλάκιον. "Οὐκ ἔξεστι βαλεῖν αὐτὰ εἰς τὸν κορβανᾶν ἐπεὶ τιμὴ αἵματος ἐστὶ."

*The old Celtic Christians used, and those who speak Celtic still use, a derivative of the Latin *offerendum* (or perhaps *offerentia*) for the Mass; Cornish, Breton and Welsh, *offeren*, Gaelic, *aifreann* or *aifrioun*. The Mozarabs of Spain, who use a rite of the same family as the old rite of the Celts, still call the book which contains the invariable portion of their Mass "Missale Omnium Offerentium," which is perhaps for "Offerentiarum" or "Offerendorum."

(It is not lawful to put them into the Treasury, because it is the price of blood.) The Latin version of St. Jerome retains the word; "Non licet eos mittere in *corbonam*, quia pretium sanguinis est," though in other passages (e.g. St. Mark xii., 41, 43; St. Luke xxi. 1; St. John viii., 28,) it uses "*gazophylacium*." Mediaeval Cornishmen must have heard this passage read or sung every Palm Sunday of their lives in the "Passion of our Lord Jesus Christ according to St. Matthew," and this, without any hypothesis of its introduction by Phœnicians, or, as Hunt suggests, by Jews, is enough to account for the use of the word to signify a "treasury" of ore. The word is evidently Syriac; but it is probable that it came to Cornwall by the same route as that by which such Aramaic words as *abbas*, *pascha*, *alleluia* and *amen* came to Britain and to Western Christendom generally, that is to say, by way of the Greek of the New Testament and its Latin translation.

In some of the romances of the Holy Grail the Castle of the Grail is called "Castle Corbenic." In the *Grand Saint Graal* the word *Corbenic* is said to be the "Chaldaean," i.e. Syriac, for "the most holy vessel." It is quite likely to be Syriac, possibly introduced by the returned Crusaders, but its meaning is not what Robert de Borron, if indeed he was the author, makes it to be, for it is more probably an adjective of Western form derived from the Syriac *ܩܘܪܒܢܐ* (*qurbana*) in its latest meaning of the Eucharist. This would be appropriate for the Grail, the Chalice of the first Mass that ever was.

H. J.

Contributions à l'Étude des Romans de la Table Ronde. Par J. Loth, Professeur au Collège de France. Paris, Librairie H. Champion, 1912, 8vo.

The greatest living authority on all matters relating to Celtic Cornwall has produced a book of a hundred and twenty-six pages, which is full of interest for Cornish people. Though the

title is fairly general, the great interest in the book is in the manner in which it deals with the best of all the mediæval romances, the story of Tristan and Ysolt. It has always been acknowledged that this story is ultimately of Cornish origin. It is true that the Breton Cornouailles has put in a claim for it, and that in the Douarnenez district there is a small cluster of place-names which seem to refer to the romance, the Ile de Tristan, Plomarc'h, where a ruin of the Roman period is known as the "Palais du Roi March," and others. But all the received versions of the story, French, German, and English, place the scene of it in our Cornwall, except when it is in Ireland, on ship-board, or, in the short episode of Iseult Blanches-mains, in North Brittany. The later form of it, that adopted by Malory, makes Tintagel the castle of King Mark; but it seems probable that the connection of that fortress with any of the Arthurian legends is a piece of mediæval literary imagination. Professor Loth, working on the topography of the two earliest Tristan poems, those of the 12th century Béroul and Thomas, to whom the Germans, Eilhart von Oberg and Gottfried von Strassburg owe their materials, has located a considerable portion of the scene very convincingly in South Cornwall, and has proved conclusively the Cornish *provenance* of the original materials.

It has been a disputed question whether the Tristan story was a compilation of independent *lais* or is traceable to a single original. M. Bédier, with whom M. Loth agrees so far, has decided in favour of a single original, but the author does not agree with him in thinking that it was the contact of the Armorican and French "jongleurs" after the Norman conquest of England which gave us the legend, nor in doubting whether the rather mixed ethical ideas of the story could possibly be of Celtic origin. Of this last theory, M. Loth disposes in his first chapter, showing from Irish and Welsh sources that the ideas of the romance are not necessarily non-Celtic, though he allows that

the love-drink seems less Celtic than the rest of the story, and in Bérout it certainly bears an English name, *lorendrant* or *lourendris*, which is evidently meant for *loren-drane* or *loren-drine*. This seem to shew a certain Saxon influence; but Cornwall is the one Celtic country where one would expect to find it.

The second chapter is a short one on the Shield of Tristan, on which was the device of a boar, a common Celtic totem. Then follows an interesting discussion of the names of *Tristan* and *Ysolt*, or *Isent*. The discussion of the first of these names in its Welsh, Breton and Cornish forms, and the alleged connection of the Welsh *Drystan ab Tallurh* with the Pictish *Drostan mae Talorg*, which is dismissed as untenable, is very interesting, but should be read in full. As for the name of *Ysolt*, it is interesting to note that it is found in Cornwall, in a place-name which is mentioned in a charter of 967. In this document, of which the body is in Latin, the boundaries of the lands conveyed are given, as is usual at that period, in Anglo-Saxon. These boundaries, of the lands of *Lesmanaoc* (in St. Keverne), are made to begin at *Porth Alow* (Porthallow) and to go along the bank against the stream to *Hryt Eselt*, which is certainly the "Ford of Ysolt." The name seems to be lost now, but the place must have been on the rivulet which runs into the sea at Porthallow, though the estate must have been a very large one, for the boundaries very soon take one "south to Castell Merit," which must be what is now Kestlemerris, three miles at least from Porthallow. As M. Loth says, it is thus established that the name is Cornish.

After two very interesting chapters on the Arthurian stories in the collection known as the "Mabinogion," and on that collection in general, the author proceeds to what is to us his most attractive chapter, "Le Cornwall et le Roman de Tristan." By an exceedingly clear piece of reasoning he shows that the writer of the

original from which Bérout and Thomas drew their inspiration must have belonged to a district of Britain which was "un pays trilingue, où celtique, anglais, français fussent couramment parlés. Ce pays existe : c'est le Cornwall." The discussion of the ethnological and linguistic conditions of Cornwall down to the 14th century is very convincing, even to those who had not already realised it, for it is drawn from all manner of ancient sources. Then comes the discussion of the geography of the Tristan poems, in which it is shown that the original author, whoever he may have been, was well acquainted with Cornish topography.

The key to this topography is found in the residence of King Mark. This is not Tintagel, as in the later romances, but a place hitherto unidentified, called by Bérout *Lancien*. M. Loth decides that this is the important manor, which appears in Domesday as *Lantien* and *Lanthien* and is now written *Lantyan* or *Lantine*. It is in Golant, or St. Sampson's, and the author does not fail to note that Bérout makes King Mark and Queen Ysolt worship in the church of "Saint-Sanson." Bérout also makes King Mark swear by St. Andrew, and the priory of St. Andrew of Tywardreath was close by Lantine, and the church of St. Sampson was once dependent on it. As the Priory was founded in the time of William the Conqueror, this particular swear, if it really has a topographical significance, puts the date of the hypothetical Cornish writer in the late 11th century at earliest. In Tywardreath parish is *Kilmarth*, which on the analogy of the undoubted *Carnyorth* for *Carnyorgh*, *Rospeth* for *Rospegh*, and *Trembath* for *Trembegh*, M. Loth considers to have been *Kilmargh*, the Retreat of King Mark. He is no doubt right in this, for the substitution of *th* for the light guttural *gh* in late written Cornish and in place-names is very common, both, especially as finals, being equally silent in late pronunciation. The island on which Tristan fought and overcame the Irish champion Morholt is said

by the romancers to be near Lancien. Looe Island is eight miles as the crow flies from Lantine, and it answers very well to the description. M. Loth, however, with commendable caution, is undecided between this and a hypothetical sandy islet in the Fowey River over against Golant, which may well have existed once, but has now disappeared. When Tristan has been condemned to be burnt, he is taken past a certain chapel, and, having obtained leave from his guards to enter and pray there, he leaps from a window, which evidently overlooks a precipice, lands safely on the soft sand below, and escapes. Chapel Point in Goran seems to M. Loth to answer to this description, and the curious part of the story of that place is that Tristan's feat was successfully imitated in the time of Henry VII. by Henry Bodrugan or Bodrigan, and the point where this happened is known as "Bodrigan's Leap." There is or was a *Lam Tristan*, Tristan's Leap, at Tintagel, which M. Loth does not mention; but that, like all the associations of the mediæval castle of the Earls of Cornwall with the Arthurian legend, is probably a literary invention. In the parish of Creed, not very far from Goran, is another Lantien. It was known as *Parva Lantien*, but is now *Nantellen*. It belonged to the Bodrigan family. When Tristan and Ysolt fled together from the court of King Mark, they took refuge in the Forest of *Morrois*. There seems no difficulty in accepting M. Loth's identification of this name with *Moresk*, the *Moireis* of Domesday, the alternative name of St. Clement's by Truro. The present application of the name is probably too restricted, and the forest no doubt extended a long way beyond the limits of the present parish.

When Queen Ysolt is to undergo the ordeal of the hot iron, or as some versions have it, is to swear to her innocence on the relics, the royal party proceeds to the White Plain, *la Blanche Lande*, to meet King Arthur, who seems to come from farther west. They cross the river at the Evil Ford, *le Mal Pas*, where

occurs the incident of Tristan disguised as a leper beggar, which gives the Queen the opportunity of a rather plain-spoken equivocation, when she comes to swear. Thence they proceed "par un vert pré entre deux vaus" to *la Blanche Lande*. Now, to go from Lantine to Nansavallen, which is the site of the manor house of Blanche Lande or Albalanda in the parish of St. Kea, especially if one went through the Forest of Moresk, it would be necessary to cross the river at *Malpas*, and proceed along green meadows, for they were green enough on that showery July day of 1912, when M. Loth "en compagnie de M. et Mme Jenner et du Rév. Taylor" made a "pèlerinage" to the scene of the poem and at the end of that stretch of green meadows between two valleys, as it was in the days of King Mark, is Nansavallen. As one of the pilgrims can testify, M. Loth's theories seemed more convincing on the spot than any amount of his excellent description can make them. We did not decide whether Nansavallen had any claim to be considered to double the parts of the House of Blanche Lande and "the island valley of Avilion," as the name might imply, but the weather there did not agree with Tennyson's estimate of that of the latter. M. Loth has an interesting discussion of the name of *Blanche Lande*, with instances of similar names elsewhere, and his theory of the original Celtic form was confirmed that day by the discovery of *Chegwyne*, which is *Chy Gwyn*, "maison blanche" and *Chirgwyn*, which is *Tir Gwyn*, "terre blanche" close together in Kea, though not now within the limits of the manor. M. Loth, on the analogy of *Ty Gwynn* in Carmarthenshire becoming *Alba Domus*, *Alba Landa* and *White land*, had already conjectured that *Blanche Lande* was a translation from the Cornish, but this discovery made it certain, and he is of opinion that *Chegwyne* may have been the site of the original mansion. "*Tir-gwynn* est naturellement devenu *White-land* pour les Anglais et *Blanche-lande* pour les Français. *Ty-gwynn* devait

designér la demeure, et *Tir-gryun* tout le manor.” The ultimate origin of the name is probably in accordance with a suggestion of Mr. Whitley, the vicar of Baldu, part of whose parish is in that manor. The uncultivated downs in Blanche Lande are largely strewn with white quartz, and therefore, as M. Loth puts it, “une bonne partie du manor était littéralement une *White Land*.”

Without treating the matter other than cautiously, M. Loth is inclined to consider that *Carlyon* in Kea, outside the limits of Blanche Lande, may be associated with Arthur. In this the present reviewer would go farther than anything said definitely in this book, and is inclined to think that this Carlyon is the *Carleon*, wrongly placed on the Usk by the Welsh writers, in which Arthur hold his courts, and perhaps even the City of the Legions which “*Britannice Kairlium dicitur*,” where Nennius makes Arthur fight his ninth battle. M. Loth has another conjecture concerning Arthur, which is of great interest. He is inclined to identify the “*Kelliwic* in Cornwall” of the Welsh stories, not, as is usual, with Callington, but with Gweek Wood, near the Helford river, which, as he says, certainly might have been *Kelly Wik* in Cornish, and where there are remains of ancient dwellings, with two important fortresses, The Gear and Carvallack, close by. He may be right, and it is certainly in favour of his theory that part of Gweek is in a parish probably called after Arthur’s alleged successor, Constantine. Whatever doubt may be thrown on the historical existence of Arthur himself, there is no doubt that Constantine was a real man, and a King of Damnonia, who is mentioned in uncomplimentary terms by his contemporary Gildas. There is only a very slight doubt as to whether he is the Constantine who was converted by St. Petrock, and became a Saint. When a Cornish parish is named after a Celtic saint, there is a very strong presumption that he was personally connected with the place, which in this

case may well mean that there was a royal residence not far off. It is fairly clear, however, from the 12th century life of St. Cuby, who was the son of Selyf or Solomon, King of Damnonia, that there was also a royal residence between the "Limar" (evidently the Lynher) and the Tamar, which is just where Callington is, where the saint was born, and there are plenty of fortresses thereabouts also.

There are many more of the minor names in the Tristan story which M. Loth finds in Cornwall, and it is not too much to say that he has completely proved his point in most cases. It seems therefore to be now certain that the original Tristan story was written in Cornwall at a period when first Saxon, and then Norman influence had come in. How much older the story may be and whether it has any historical foundation, we have no means of knowing. It is possible that by the same process of topographical inquiry, the whole Arthurian cycle may be traced to Cornwall. This is not to say definitely that the events recorded, so far as they have any historical basis, really happened there. That is a matter on which we must be content for the present to be agnostics. But the genius who first hit upon the grand idea of making the rather shadowy Arthur of Nennius into a hero of splendid romance, may well have been a Cornishman, who either worked up his own nation's traditions or transferred those common to all the Britons to places known to himself. Was this Cornishman the *Breri* of Thomas, the *Bleheris* of Wauchier de Denain's continuation of the *Perceval* of Chrétien de Troyes, the "famosus ille Bledhericus fabulator" of Giraldus Cambrensis, and perhaps even, transferred for romantic purposes from the 11th century to the 6th, *Blehis* or *Blihos Bleheris* of the Prologue to the "Conte del Graal," who tells the story of the destruction of the realm of Logres (*Lloegr*, the Welsh for England) after the evil deeds of King Amangons, and comes to Arthur's court with his goodly tales, and the *Blaise*, who "estoit

moult boius elers," to whom Merlin tells the story of Joseph and Naciens, and many other things, that he may write them down? There is an interesting discussion, cautiously inconclusive, about this mysterious *Breri*, *Bleheri* or *Bledhericus* in M. Loth's book. He does not, however, note that the name is found in Cornwall. There is a *Trebleri* in Domesday, and names beginning with *Bledh*, wolf, *Bledheuf* and *Bledhros*, are found in the Bodmin manumissions. There is more to be worked out about this writer, though one does not at present see how do it.

H. J.



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I. SIR RICHARD RAWLINSON VYVYAN, Baronet, M.P., F.R.S.
First Vice-President.

THE earliest known ancestor of the Vyvyans of Treloarwarren in the male line is one Vivian, whose son Ralph is mentioned in a Patent Roll of the 14th year of King John. Ralph son of Vivian married Isabel, daughter of William de Bodrugan, and his son Sir Violl Vyvian of Trevidran in Buryan, who married Margaret, daughter of Christopher Earl of Kildare, was living in 28 Hen. III. But there is a tradition, which is told also of an ancestor of the Trevelyans, to the effect that a much earlier Vivian escaped by the strength of his horse when Lyonesse was submerged, and landed somewhere in the neighbourhood of Perran Uthnoe. Pryce mentions it in the vocabulary in his (or Tonkin's) "*Archaeologia Cornu-Britannica*," under the word *chuyryan*, to flee, to escape, and derives from the word and incident the name and arms (argent, on a mound in base vert, a lion rampant gules armed sable: crest, a horse passant, argent, furnished proper) of the family. The somewhat similar Trevelyan arms, gules, the base undée of five, argent and azure, a demi-horse issuant of the second, maned and hooped or, seem to allude to the same story. The word *chuyryan*, an impossible Cornish form, is probably founded on the Welsh *chwifio*, to fly about, to wander. The name Vivian is not in any way connected with it, but is a not very rare Christian name, both masculine and feminine. There was a St. Vivian, a fifth century Bishop of Saintes, whose name occurs on the 28th August in some French

calendars, and a small town, St. Vivien, in Guienne, near the mouth of the Gironde, is called after him. The name of Vivien la Fay in the Arthurian romances is well known, and the names "Vivien" and "Vivienne" are still used in France. The arms, however, are apparently founded on the tradition, of which let every man believe as much as he pleases. It seems probable that the Vivians are of Celtic rather than of Norman descent, and, with the possible exceptions of the Arundells and the Trefusises, have the longest pedigree in the male line, in Cornwall, of any Cornish house. That their pedigree should have been well worked out is due to the fact that the greatest of Cornish genealogists happened to be of that family.

John Vivian, sixth in descent from the Sir Violl of Henry III's time, married Honor, daughter and heiress of Richard Ferrars of Trelowarren, in the parish of Mawgan in Meneage. He was living in the 29th year of Henry VI. (1450-1.) From Haniball Vivyan of Trelowarren (died 1610), fifth in descent from this John, descend, through his sixth son Roger, the Vivians of Camborne, Roskear, Pencalenick, and Tregavethan, and, except for the Trenowth family, with its Truro offshoot, now represented by Lord Vivian, who descend from Ralph, half-brother of the first John of Trelowarren, all those who now spell their name "Vivian." Of these the present senior representative is Mr. John Vivian, of Meadowside, Hayle. The son of Sir Francis Vivyan, eldest son of Haniball, Sir Richard Vyvian, M.P. for Penryn in 1640 and for Tregony in 1641, a zealous Royalist, was created a Baronet by King Charles I. in 1645. His eldest son, Sir Vyell Vyvian, succeeded him, but left no descendants, and was succeeded by his nephew, Richard, son of his brother Charles. Sir Richard Vyvyan, who seems to have been the first to settle finally the spelling of the name, succeeded to the baronetcy in 1697. He was very active in the cause of King James the Third, and in 1715, after the King had been proclaimed at St. Columb

by James Paynter on October 7th, and a projected descent on the Cornish coast, in arranging for which Sir Richard had been very prominent, had been frustrated by the treachery of a trusted agent, Colonel Maclean, he was arrested and imprisoned in the Tower of London, but was released for want of evidence, for he had had time to destroy his papers. He died in 1724. He was succeeded by his eldest son Sir Francis, the fourth Baronet, whose son, Sir Richard, fifth Baronet, died without issue in 1781. He was succeeded by his brother, Sir Carew, who died unmarried in 1814, and was succeeded by his first cousin once removed, Vyell, son of Philip, son of Richard Vyvyan of Tresmarrow, brother of the fourth Baronet. Sir Vyell Vyvyan, the seventh Baronet had four sons, the eldest of whom succeeded him, and is the subject of this memoir.

Sir Richard Rawlinson Vyvyan was, as has been said, the eldest son of Sir Vyell Vyvyan of Trelowarren. His mother was Mary Hutton, daughter of Thomas Hutton Rawlinson, of Lancaster. He was born on the 6th of June, 1800, and succeeded his father as eighth Baronet in 1820. He was educated at Harrow and at Christ Church, Oxford, but left the University without taking a degree. On the 5th of September, 1820, he was appointed Lieutenant Colonel of the Cornish Yeomanry Cavalry, at a curiously early age for such a position. On the 27th of January, 1825, he was returned to Parliament for the County of Cornwall at a by-election, and was re-elected at the general elections of 1826 and 1830. In 1831 he was thrown out, but was elected for the borough of Okehampton in the same year. Okehampton ceased to return members to Parliament at the Reform Act of 1832, and at the election of that year Sir Richard Vyvyan was returned for Bristol, and was re-elected in 1835. From 1837 to 1841 he was not in Parliament, but in 1841 he was elected for the borough of Helston, which he continued to represent until the dissolution of March, 1857, after which he did not seek re-election. In 1840 he was High Sheriff of Cornwall.

In politics Sir Richard Vyvyan was a Tory of the extremest school. He opposed Catholic Emancipation, Parliamentary Reform, Free Trade, and the Income Tax. He voted against Sir Robert Peel's repeal of the Corn Laws, and against the Disraeli Budget of 1852. As he was an unusually fine speaker, his support was of considerable value. When not engaged in his Parliamentary duties he seems to have led a very retired life at Trelowarren, devoting himself to science and philosophy. Though he produced very little in the way of published work, he had a great and by no means undeserved reputation as a geologist and a metaphysician. It was through his reputation in both these subjects that on its first appearance in 1844 he was one of those to whom that remarkable book "*Vestiges of the Natural History of Creation*," was attributed. In many subjects, however, he appears to have held rather eccentric views. In "*Memories of Old Friends, being extracts from the Journals and Letters of Caroline Fox*," published in 1883, there is an interesting passage about him, dated January 7th, 1837.

"Henry de la Beche gave us an amusing account of his late visit to Trelowarren. Sir Richard Vyvyan was always beating about the bush, and never liked openly to face an adverse opinion, but was for ever giving a little slap here and a little slap there to try the ground, till De la Beche brought him regularly up to the point at issue, and they could fight comfortable with mutual apprehension. His metaphysical opinions are very curious; indeed, his physical views partake very much of the nature of these, so subtilly are they etherialised. He has a most choice library, or, as De la Beche calls it, a collection of potted ideas, and makes, I fancy, a very scholastic use of it."

Besides studying geology and metaphysics, Sir Richard conducted, in conjunction with Dr. Charles T. Pearce, a number of interesting experiments in light, heat and magnetism. In 1826, on the proposal of Davies Gilbert, he was elected a Fellow

of the Royal Society, as, to quote from his certificate, "a Gentleman of considerable literary and scientific acquirements, especially in the Philosophy of Natural History." He was also a Fellow of the Geological Society.

He died unmarried on the 15th of August, 1879, and was succeeded by his nephew, the son of his next brother, Vyell Francis, the Rev. Sir Vyell Donnithorne Vyvyan, Rector of Withiel, the ninth and present Baronet.

Sir Richard Vyvyan was one of the original Vice-Presidents of the Royal Cornwall Polytechnic Society at its first establishment in 1833, and held office until 1835. He was elected again in 1842 and 1843. Though he took considerable interest in the Society, and in 1841 is recorded to have made a donation of £50 to its funds, he does not appear to have contributed any notes or papers to the reports.

The published works of Sir Richard Vyvyan were very few, and his scientific works were all published anonymously. To his original and rather eccentric scientific views he seems to have added a certain diffidence, which prevented his putting them forward with his name to them. The following is a list of his known works.

1. Cornwall Election. Speech of Sir Richard Vyvyan. Undated, probably 1825.
2. Essay on Arithmo-physiology, or the chronological classification of organised matter, deduced from an inspection of the numbers employed in the division and subdivision of the different parts of vegetables and animals. Privately printed by J. Nichol and Son, London, 1825. 8vo. Anonymous.
3. Speech of Sir Richard Vyvyan in the House of Commons on Reform of Parliament, 21 March, 1831. London, 1831. 8vo.

4. Psychology ; or a review of the arguments deducible from philosophy and tradition in proof of the existence and immortality of the animal soul. Vol. I. Philosophical evidence. J. B. Nichol and Son, London, 1831. 8vo.

This book was published anonymously, was withdrawn almost immediately, and no more of it published.

5. Letter from Sir Richard Vyvyan, Bart., M.P. to his constituents [at Helston] on the commercial and financial policy of Sir Robert Peel's administration. J. Bohn, London, 1842. 8vo.
6. On the Harmony of the Comprehensible World, in relation to the abstract truths of mathematics and arithmetic, the phenomena of nature and the highest metaphysical conceptions of the human mind. 2 vols. J. Bohn, London, 1842. 8vo.

Another edition, in one volume. London, 1845. 8vo.

This book, which in the one volume edition ran to 527 pp., was published anonymously, but the secret of the authorship, if it ever was a secret, was given away by the appearance on the title-page of the second edition of the words "Sapere Aude," that modern motto of the Vyvyan family, which some have translated as a punning allusion to the peculiar spelling of the name of the Trelowarren line.

7. Letter from Sir Richard Vyvyan, Bart., M.P., to the Magistrates of Berkshire upon their newly established practice of consigning prisoners to solitary confinement before trial, and ordering that they be disguised by masks whenever they are taken out of their cells. Ridgway, London, 1845. 8vo.

II. JOHN SAMUEL ENYS, *Vice-President*.

The family of Enys of Enys, in the parish of St. Gluvyas, has been in possession of the property from which the name is



JOHN SAMUEL ENYS, of Enys.

Vice-President of the Royal Cornwall Polytechnic Society
(1834, 1846—48, 1850—52).

derived since the early part of the fourteenth century at least, and held it in the male line until 1802. The earliest recorded member of the family is Robert de Enys, whose son John made a grant of lands in Penryn in the 10th year of Edward III (1336-7). The estate is mentioned in the 14th century Cornish Drama, *Origo Mundi*. In this play, King Solomon says to the workmen of the Temple :

*Banneth an Tas re ges bo,
Why as byth, by godys fo,
Agas gobyr eredy,
Warbarth ol gueel Behethlen,
Ha coys Penryn yn tyen,
My as re lemyn theugh why ;
Hag ol Guerthour,
An Enys hag Arwennek,
Tregenver ha Kegyllek
Annethe gureugh theugh chartour.*

The blessing of the Father be yours
You shall have, by God's faith,
Your wages surely,
Together with all the field of Bohelland [in Gluvyas],
And the Wood of Penryn completely,
I give them now to you,
And all Guerthour [probably *Gwarder*, in
Gluvyas],

Enys and *Arwenack*,
Tregenver [in Falmouth parish] and *Kegyllek* [*Ker-*
gilliack, in Budock],

Of them make a charter to you.

As the three Miracle-plays, of which the *Origo Mundi* is the first, were in all probability written in Glasney College in Penryn, it is no wonder that the names of the places introduced to amuse the audience with local colour should be in the immediate neighbourhood of Penryn.

The eleventh in descent from the John de Enys who granted lands in 1336-37 was Samuel Enys of Enys, who died in 1776. His only son John died in 1802 without issue, and the male line of the Enyses of Enys, who had held the same estate for at least five centuries, came to an end. The estate was inherited by the sister of the last male Enys, Lucy Anne, widow of Samuel Oliver Hunt, of Stratford-on-Avon. She resumed the name of Enys, and her son John Samuel Hunt, who succeeded her in 1857, adopted it also.

John Samuel Enys, originally Hunt, was born on the 21st of September, 1796. He married Catherine, daughter of Davies Gilbert, the Cornish historian, by whom he had three sons and two daughters. Two of his sons, Francis Gilbert, and John Davies, successively inherited the estate and died unmarried, the last, who was well known to members of the Polytechnic Society, and of whom an obituary notice appears in this number of the Report, died on the 7th of November, 1912. Of the daughters, one, Jane Mary, married Commander Henry Rogers, R.N., and died in 1874, the other, Mary Anne, is still living. On the death of John Davies Enys his nephew, the Rev. Enys H. Rogers, succeeded to the property and has adopted the name of Enys.

John Samuel Enys was made a Vice-President of the Royal Cornwall Polytechnic Society in 1834, and again in 1846-48 and 1850-52.

He contributed the following notes and papers to the Report :

- 1842. Remarks on Floating Light Vessels.
Remarks on Ship's Fastenings and Steamboats.
- 1851. Plan for Floating Light Vessels and Buoys.
- 1854. On the Application of the Displacement Curves of Fish to the Construction of boats.
- 1863. Specimens of Hornblende and Serpentine, from the junction at Porthalla.



EDWARD WILLIAM WYNNE PENDARVES, M.P., F.R.S.
Vice-President of the Royal Cornwall Polytechnic Society
(1834—35, 1840—42, 1849—51).

1866. On the probable Course of Tyrian or Carthaginian Ships to Cornwall.

He took an important part in the organisation and working of the Society until his death, which occurred in 1872.

III. EDWARD WILLIAM WYNNE PENDARVES, M.P. *Vice-President.*

The ancestry of the Pendarves family is not known so far back as that of either the Vyvyans or the Enyses, and the male line of it appears to have died out or disappeared. The earliest Pendarves mentioned in the Heralds' Visitations is an undated John, whose daughter Florence was married in 1549. He had also a son, David Pendarves of Crowan. As the name is evidently taken from the estate of Pendarves in Camborne, it is probable that there was an older unrecorded branch of the family seated there, from which the Crowan branch eventually inherited. David had three sons, John Pendarves of Constantine, who died in 1616, from whom descended a family which ended in heiresses, the senior of whom married Francis Basset of Tehidy, and died in 1740; William, who died unmarried; and Thomas Pendarves, of Pendarves in Camborne, who is the first recorded Pendarves of Pendarves. Alexander, son of this Thomas, who is called in his will "Alexander Thomas, alias Pendarves," a good instance of the development of a Cornish surname, died in 1624. His son Richard, who died in 1674, had an eldest son William, who died without issue in 1683, and a second son Richard, whose son, also Richard, succeeded to the Pendarves estates on his uncle's death. He died childless in 1706, and was succeeded by his cousin, Sir William Pendarves, M.P. for St. Ives, the son of the Rev. Thomas Pendarves, Rector of Mawgan and St. Columb, third son of the first Richard. He also left no heir, and, dying in 1728, was succeeded by his sister Grace, who married successively Robert Coster of Truro, and Samuel Percival of Clifton, but had no children. Meanwhile Dorcas,

the only other child of the first Richard Pendarves, had married John Courtenay of Tregellas in Probus, and had an only daughter, Catherine, who married John Williams of Trehane in Probus. Her only daughter, also Catherine, married the Rev. William Stackhouse, D.D., Rector of St. Erme, to whose second son, John, the property was left by Grace Percival. John Stackhouse married Susannah, only daughter and heiress of Edward Acton of Acton Scot, Hampshire, and the eldest surviving son of this marriage, Edward William, succeeded to the Pendarves estates, while the second son, Thomas Pendarves Stackhouse succeeded to the property of his maternal grandfather, and assumed in 1834 the name of Acton. In 1815 Edward William Stackhouse assumed first the name of Wynne, and then that of Pendarves, dropping that of Stackhouse. On his death in 1853 he left the property to William Cole Wood, son of John Wood of Ashfield Martock in Somerset, by Mary Anne, daughter of the Rev. Thomas Coleman, Rector of Church Stretton, and Anne Gregor his wife, daughter of John Stackhouse. Mr. William Cole Wood assumed the name of Pendarves in 1861.

Edward William Wynne Pendarves was Member of Parliament for the County of Cornwall from 1826 to 1850. He was elected a Fellow of the Royal Society in 1827 on the nomination of Davies Gilbert, being described in his certificate as "a Gentleman conversant in various branches of Natural Knowledge." He became a Vice-President of the Royal Cornwall Polytechnic Society in 1834, and continued so in 1835. He was re-elected in 1840 to 1842 and again in 1849 to 1851. He does not appear to have contributed any papers or notes to the Reports of the Society, though he took considerable interest in its management. He married Tryphena, daughter and heiress of the Rev. Browse Trist, of Bowden, Devon, but had no children. He died in 1853.

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JOHN ST. AUBYN,
1st BARON ST. LEVAN.

President of the Royal Cornwall Polytechnic Society, 1868—1870.

(From a Portrait at St. Michael's Mount).



— THE —
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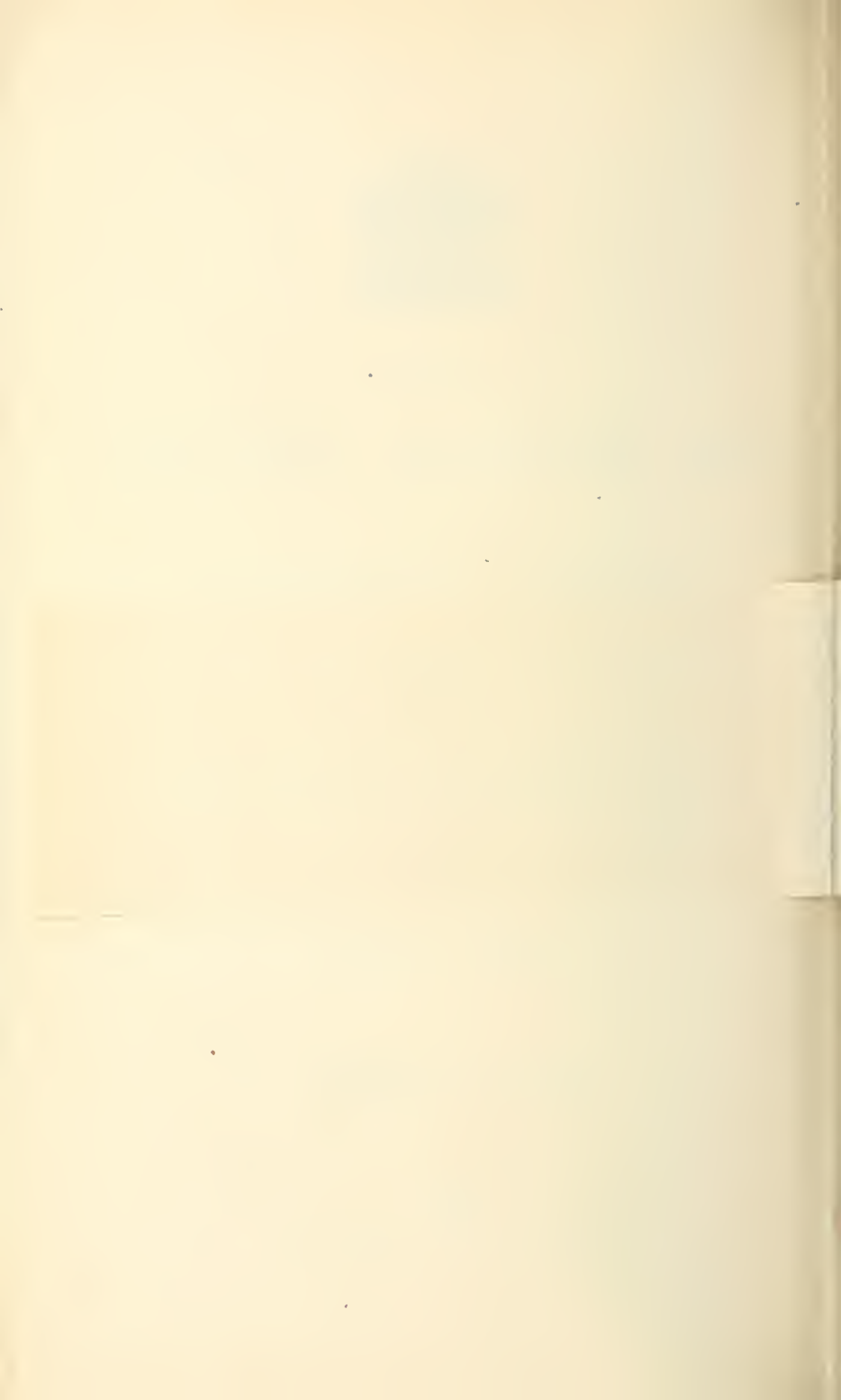
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NOTE. *The Secretary will be obliged if the Members will inform him of any errors or necessary alterations in these lists.*

Annual General Meeting.

THE Eighty-first Annual General Meeting of the Royal Cornwall Polytechnic Society was held in the large Committee Room of the Polytechnic Hall, Falmouth, on Monday, February 9th, 1914, Mr. Howard Fox presiding, in the absence of the President (Lord St. Levan) who was prevented by his Parliamentary duties from attending.

Among those present were. Rev. Enys H. Enys, Capt. Arthur Rogers, Messrs. H. O. H. Etheridge, Edward Allen, C. Fisher, J. B. Phillips, F. Chegwiddden, Wilson L. Fox, Loftus St. George Byne, F.L.S., H. D. Acland, F.G.S., F. J. Bowles, M. J. Stewart, Henry Jenner, F.S.A., E. P. Kestin, R. Barclay Fox, W. W. J. Sharpe, E. C. Mills, J. E. Blight, Mrs. Byne, Miss Edith Blight, Mrs. Horton Bolitho, The Misses Mills, Mrs. Jenner, Mrs. Blight, Mrs. W. L. Fox, Mrs. Howard Fox, Miss L. Barclay, Miss Stella Fox, Miss S. P. Armstrong, Miss Kate Lanyon, Mr. E. J. Moseley, and the Secretary, Mr. E. W. Newton, F.G.S.

The Chairman stated that letters of apology for non-attendance had been received from the President (Lord St. Levan), the Hon. H. W. F. Trefusis, Col. Courtney B. Vyvyan, Messrs. J. P. Rogers, J. H. Collins, L. Van Grutten, R. H. Kirton, John Gill, Horton Bolitho, Robert Fox, J. Couper, the Rev. Canon H. Hugh King and Mrs. King, Mr. and Mrs. E. Kitto, and Miss Maud Pease.

The minutes of the last meeting were read and confirmed.

The Report of the Council for 1913 was read by Mr. H. Jenner.

The Chairman moved the adoption of the Report as read, remarking that the Polytechnic Society offered advantages to every young man in every town in Cornwall. Although the

Observatory had given them an immense amount of trouble, it was the child of the Polytechnic, and now the parent Society had adopted it. The past year had been momentous, owing to the loss of many very distinguished and valued members. He hoped they would secure worthy successors.

Mr. W. W. J. Sharpe in seconding, pointed out that whilst records were being made of the work done by the Observatory Committee and the Observatory Staff, there was an omission in the report of the name of the Honorary Secretary, Mr. Wilson Fox. He felt sure it was simply an oversight on the part of those who prepared the report for the past year. Mr. Wilson Fox has been Secretary for 36 years, and has rendered invaluable service to the Society.

Mr. H. D. Acland supporting, paid a tribute to the services rendered by Mr. Wilson Fox. He remarked that no one except those who had been on the Observatory Committee knew what that Committee, the Polytechnic Society, and he might add, Science at large, owe to the present Secretary. Under their altered conditions, he was afraid people did not appreciate what had happened. They must remember that the magnetic Observatory had been one of only four in the country. It had performed a scientific work, and no one could tell the result. They did not know, neither would they know for many years. The only chance of getting good results of such scientific work, was to have it accurately done for a long period. That, unfortunately, had broken down. The real loss was that the Observatory should cease to exist as a Magnetic Observatory. In conclusion he desired to record his thanks as a member of the Committee, and also of the Polytechnic Society, to Mr. Wilson Fox for the work he has done for so many years. The report was adopted.

Mr. Wilson Fox, Honorary Secretary, presented his annual report of the Observatory Committee. He was pleased to say at

the outset that they had a unanimous Committee, that the Observatory was on a sound footing, and was still in active operation. It was now brought more up to date, and furnished information which was utilized for the "Daily Weather Report." He had no hesitation in saying that this would be a great advantage to Falmouth. Perhaps they hardly realised this, and the importance of Falmouth appearing under the auspices of the Meteorological Office, through the newspapers, and being placed on an equality with the other health resorts. Mr. Fox referred to the assistance they had received from Dr. W. N. Shaw, F.R.S., Director of the Meteorological Office, who was ever ready to advise them, and from Mr. Edward Kitto, their late Superintendent.

The rainfall for the month of January last was rather extraordinary, there being only 1·8 inches, as compared with 5·3 inches in 1912, and an average of 4·2 inches for the last 31 years. During that period it had been less on three occasions, viz. in 1896 when it was 1·3, in 1898 when it was 1·2, and in 1911 when it was 1·7. With regard to bright sunshine, in 1913 Falmouth took the third place in the list of 31 towns published in the Western Morning News and Western Daily Mercury. Since then, notwithstanding the very small rainfall, it had fallen behind. During January the bright sunshine was 30 hours, being the least for 30 years. In January 1895 there were 87 hours, and the average for 30 years was a little over 58.

Mr. F. J. Bowles proposed the adoption of the Report, remarking that the Observatory still stood, and was likely to do a vast amount of good work. With reference to the discontinuance of the Magnetic Observatory, it was certainly a distinct loss to Falmouth, and he regretted it. They would find from the report that a good deal of work has been accomplished by the Meteorological Department. Mr. Wilson Fox was always ready to do all that could be done. The report was adopted.

Mr. Newton referred to the indefatigable efforts of Mr. Wilson Fox in connection with the Observatory. Being a Secretary himself, he fully realised and appreciated the valuable work that had been done in such a modest manner by Mr. Wilson Fox. He had no hesitation in saying that Mr. Fox was the inspiring spirit of the Observatory Committee. Seeing it was a section of their Society, he thought it fell within their province, and was their duty to recognize the honorary work which had been given for so many years by this gentleman. Mr. Newton then presented the Statement of Accounts for 1913, and moved their adoption. In explanation of the item referring to Books, etc., he said that he considered they had one of the best Libraries in the County, and in his opinion, the best Librarian in the country. The money spent in this department was in a good direction. He took the opportunity of calling attention to one particular matter. Amongst their members were a large number of gentlemen who have libraries, and who had the interest of this Society at heart, and in these there were probably duplicate books, or works of reference that they did not require, and possibly were of little use to them. He would be glad if they would kindly present these superfluous works to the Society, and he could assure them they would be gratefully received, and would certainly improve their collection.

Mr. M. J. Stewart in seconding, remarked that the accounts were most satisfactory. The accounts were adopted.

Mr. R. Barclay Fox proposed that the following gentlemen be elected-Vice Presidents, viz., the Lord Bishop of Truro, Mr. Geo. T. Holloway, Mr. Bedford MacNeil, Mr. F. J. Stephens, and Mr. Percival D. Williams. He was delighted to add the name of the Lord Bishop to their list of Vice-Presidents. Mr. McNeil was an eminent Mining Engineer, and Mr. Holloway was instrumental in arranging the visit to the County of the Scientific Party some eighteen months ago. They were indebted to Mr. Stephens for

the very interesting paper he gave them last Summer at St. Mawes. Mr. Williams took a keen interest in everything that was to the interest of the Society, and was one whom they all appreciated.

This was seconded by Mr. H. D. Acland, and carried.

Mr. H. Jenner proposed, and Mr. R. Barclay Fox seconded the appointment of Mr. E. P. Kestin as Treasurer in place of Mr. E. W. Little, who has left the town.

Mr. H. Jenner presented his Report as Librarian. He desired on behalf of the Royal Institution of Cornwall to thank the Polytechnic Society for their donation of £25, which he could assure them was much appreciated. They would probably remember that the Institution endeavoured to raise £1,750, in order to secure Mr. J. C. Williams' conditional promise of a further £1,750. He was glad to be able to tell them that the new buildings were going ahead very well indeed, and would probably be finished in a comparatively short time. The report was adopted.

The Chairman remarked that Mr. Wilson Fox had kindly presented to the Society a picture, "The Carnegie Institution of Washington." In one of the smaller pictures could be seen the yacht of the Institution in Falmouth Harbour.

The Chairman proposed the election of the following as Honorary Members of the Society:—Mr. Robert Simpson Woodward, Ph.D., LL.D., Sc.D., Mr. Clement Reid, F.L.S., F.G.S., F.R.S. This was seconded by Mr. W. L. Fox, and carried.

Mr. E. W. Newton stated that he had the pleasant duty of proposing 26 new members. In the usual trend of events they lost a number of members by death, about 10 or 12 each year. One of the anxieties of the Secretary was to keep up the membership. The very fact that they were holding their next Exhibition at St. Austell revived interest in that locality, and accounted for

the large number of gentlemen proposed in that district. Wherever they went they generally made new friends, who, sooner or later, became members of their Society. The new members proposed were as follows :—

W. J. Nicholls,	C. H. Shackell,	}	St. Austell.
H. W. Higman,	Tom J. Smith,		
T. H. Williams,	H. O. H. Etheridge,		
Henry Stocker,	A. C. Jenkinson,		
John W. Higman,	W. F. Bellamy.		
D. H. Shilson,			
J. H. Coath, Liskeard.			
Joshua Bath Phillips,	Edward Allen,	}	Falmouth.
Frank Harris,	George Harris,		
E. P. Kestin,	John Harris,		
C. P. Fisher.	Percy O. Fell,		
Mrs. King,	Rev. Hugh King,		
Mrs. Couper,	J. Couper.		
The Rev. Archibald H. Wood, Portscatho.			
L. Van Grutten, Roseteague, and			
J. C. Shepherd, Redruth.			

Mr. M. J. Stewart seconded, and said that no doubt the large number of gentlemen included from the St. Austell district would prove to be of great service to the Society. He congratulated the Society on their decision to hold the Exhibition at that town. The Society only required to be better known to be more strongly supported.

The Rev. Enys H. Enys supported, and the resolution was carried unanimously.

Mr. F. J. Bowles proposed that votes of thanks be accorded to Mr. Wilson Fox (Hon. Secretary of the Observatory Committee), Mr. Jenner (Hon. Editor and Librarian), to the gentlemen who gave papers at the Summer Meeting, to Mr. and Mrs. Spry,

Mrs. J. C. Thomas, to Rev. A. H. Wood and Mr. Van Grutten, and all who assisted in making the excursions so enjoyable.

Mr. Chegwiddden seconded, and the resolution was carried.

Mr. E. P. Kestin proposed a hearty vote of thanks to the Chairman for presiding. He took the opportunity to thank the Society for electing him as their Treasurer.

Mr. H. D. Acland seconded, and the vote was carried with acclamation.

Mr. Howard Fox replied thanking the meeting, and read an interesting list of the various Chairmen who have presided at the annual meetings since the formation of the Society.



Report of the Council for 1913.

THE Committee has pleasure in recording, that during the past year the Society has maintained its satisfactory condition both in membership and finance.

The Summer Meeting opened on the 15th July, when an Excursion being arranged to visit St. Mawes and Gerrans a special steamboat was chartered, and a large number of members and their friends availed themselves of the opportunity of visiting this interesting district. A paper on "The Governors of St. Mawes Castle" was given by Mr. F. J. Stephens, and Mr. Henry Jenner read a paper entitled "Dingerein Castle." Your thanks are due to these gentlemen, and to Mr. J. S. Spry for his courtesy in allowing the Party to inspect his house. St. Anthony Church adjoining was also inspected. These were much appreciated, and thanks are due also to Mrs. J. C. Thomas, who with her late husband received the party at Trewince, and subsequently generously entertained them at luncheon at Portscatho.

In the afternoon Gerrans Church was visited, where Rev. A. H. Wood, the Vicar, gave an interesting account of its various points of note. He afterwards accompanied a number of the party to Roseteague, where under his guidance the Manor House and Grounds were inspected; you are particularly indebted to Mr. Wood for the interest he took in the day's proceedings, and also to Mr. Van Grutten for the opportunity of visiting his interesting estate.

On the second day, 16th July, a Meeting was held at the Polytechnic Hall, presided over by Mr. Wilson L. Fox, F.R.Met. Soc., who read a paper on "The Magnetic Declination" which

was contributed by Professor Henry Louis, M.A., D.Sc. The subject was discussed by the members present, and the Chairman informed the Meeting that he would compile a Declination Table from observations taken at the Observatory during the past 25 years, a copy of this, which has since been printed and circulated amongst those most likely to be interested, will be found in the Report of the Observatory Committee.

In the evening a display of Natural History "Kinemacolor" pictures was given in the Hall.

On the next day, 17th July, an excursion to Marazion, Chysauster, Castle-an-Dinas and St. Ives was arranged, and was attended by about fifty members. In response to the kind invitation of your President, Lord St. Levan, St. Michael's Mount was visited, and Mr. Jenner read a paper in the Chapel on the alabaster carvings behind the Altar; a paper was also read by him later in the day at Chysauster, on the but-clusters there.

On the return journey, Castle-an-Dinas was visited, and also St. Ives Consols Mine, where the visitors were received by Mr. Cann, and other members of the Executive, who conducted them over the Mine, and explained the machinery. The specimens of ore from which Radium is extracted were objects of much interest.

St. Ives was then visited, where a short stay was made, and tea provided at Mr. Newton's Bungalow before the members returned. On this occasion Motor Cars only were used, many of which had been lent by members of the Society, and this fact enabled a great deal more to be done in the time available, and it was generally agreed that it would be advisable to employ this means of locomotion when possible in any future excursions.

Your thanks are due to your President, the Directors of the St. Ives Mines, those members who so kindly placed their Motor Cars at the disposal of the Society, and all those who contributed in making the Excursions so generally enjoyable.

During the whole period of the Meeting the usual Fine Art productions of the Art Classes in connection with the Cornwall County Council were displayed in the Polytechnic Hall. Full particulars of these, with awards, will appear in the Annual Report.

Mrs. Henry Jenner also sent a collection of Water Colour Studies, illustrating her various holidays spent abroad. These were much appreciated and admired, and your Committee subsequently presented this lady with the Society's First Silver Medal for her esteemed exhibit.

Full particulars of the various excursions, as well as the papers read at them, will appear in the Annual Report.

Mr. H. D. Acland kindly consented to act as your Delegate at the Meeting of the Corresponding Societies of the British Association which was held at Birmingham, Sept. 10th-17th. Dr. Chalmers Mitchell was President of the Conference of Delegates. He gave a very interesting address on "Utility and Selection." The other papers read were "The Relationship of Local Museums with Educational Institutions," by the Rev. Wm. Johnson; "Plant Extermination," by Mr. A. R. Horwood and Mr. R. H. Whitehouse.

There was a considerable discussion as to the place of meeting of the Conference of Delegates during the next year 1914, as the British Association Meeting will be held in Australia. Your Delegate took part in it, urged that the delegates are delegates to the British Association and are not an independent body, and that the Conference should always be held under the control of the British Association.

The Conference will probably be held at Havre, during the Meeting of l'Association Française pour l'Avancement des Sciences at Havre, which commences on August 4th, 1914, to which members of the British Association have been invited.

Your Delegate took the opportunity of thanking the Association and especially the members of Section A. for their support for so many years of the magnetic work of the Falmouth Observatory, and expressed the very great regret of the Observatory Committee that it should no longer be possible to carry on that work.

An invitation having been received from the St. Austell Urban District Council to hold the Exhibition there in 1914, Mr. Bowles and your Secretary visited St. Austell and met by appointment Mr. W. J. Nicholls, the Chairman, and other gentlemen connected with the China Clay Industry. Their report was carefully considered by your Committee, who decided the usefulness of your Society would be extended by holding the Exhibition in a new district, particularly as that town is the centre of one of the most important industries of the County. It was unanimously resolved to reply accepting the invitation with thanks.

An influential local Committee has been appointed, consisting of the District Council and other leading engineers and residents of St. Austell, to make the necessary arrangements for receiving the Society on that occasion ; your Secretary has since met this Committee by invitation, when it was resolved to provide suitable buildings for the Exhibition free of any charge, and to do all in their power to make the visit a success. A number of gentlemen connected with this Committee have signified their willingness to join the Society, and their names are included in the list of new members for election to-day.

With reference to the Falmouth Observatory and in continuation of the information contained in the last Annual Report, your Committee wish to place on record the following facts.

The work of the Observatory, both Meteorological and Magnetical, was carried on without intermission for the six months ending 30th June, the Meteorological Committee continuing their grant at the rate of £250 per annum, and the Royal Society

contributing £150 for that period. Your Committee desire to express their grateful acknowledgments for these sums. They hoped that the necessary funds would be forthcoming for the continuance of the important work of the Observatory, and they used their best endeavours to obtain the active support of various leading scientific institutions and scientists to promote an appeal to the Treasury for an annual grant. Although the object met with general sympathy and approval, no disposition to co-operate in such an appeal was shown.

A Memorial was, however, prepared by your Committee, and the case was laid before the Chancellor of the Exchequer by Mr. C. S. Goldman, the member for the United Borough. The Chancellor in his reply regretted that he was unable to sanction a temporary grant towards the upkeep of the Falmouth Observatory. It was therefore concluded that its existence would terminate on the 30th of June. Formal notices were given to the authorities concerned, and to Earl Kimberley relinquishing the land surrounding the Observatory on the North and East (which through his and his predecessor's consideration had remained vacant for its protection), and to the staff and others terminating their respective agreements.

Dr. W. Napier Shaw, F.R.S., Director of the Meteorological Office, London, visited the Observatory between the 13th and 19th of May, for the purpose of preparing a report to the Meteorological Committee upon the allocation of the funds set free by the prospective discontinuance of the Observatory. The position was exhaustively considered and a scheme was drawn up, whereby it was arranged that the Polytechnic Society should let the Meteorological Committee have the use of the Observatory free of rent and that the Observatory Committee, for a monetary consideration, should be liable for the upkeep of the premises and have charge of the domestic arrangements, so that the dwelling part of the building might be available for a

Meteorologist to reside in. The Meteorological Committee undertook to be responsible for the staffing and equipment and for the regulation and control of the work to be done. With a view to carrying out these arrangements, which were to extend over a year, your Committee purchased the bulk of Mr. Kitto's furniture at a valuation. They also presented him with a substantial sum, and gave Mrs. Kitto and Mr. Phillips honorariums on the termination of their services on the 30th June. An illuminated Testimonial, signed by your President and all the members of the Observatory Committee and the Honorary Secretary and framed, was presented to Mr. Kitto on his leaving, after over 44 years of valuable and faithful service. A copy will appear in the Annual Report. Further details will be given in the Report of the Observatory Committee, to be found near the end of the Annual Report. In conclusion, your Committee express their warm appreciation of Dr. Shaw's able initiation and constant co-operation, whereby an Institution, which has been conducting since 1868 important Meteorological and other scientific work, has been saved from extinction. It is hoped that the Falmouth Observatory will, under new conditions, be as faithful in contributing to present day requirements in practical weather problems and meteorological science generally, as it was for 45 years subservient to the special purposes for which it was originally established as one of the seven Meteorological Observatories of the first order for the United Kingdom.

A Life-like portrait of the late Mr. James Tangye, the founder of the firm of Tangye Ltd., by Mr. Wm. Cock, has been presented by Mr. George Tangye, to whom your thanks are due for his continued liberality to the Society.

Mr. F. J. Bowles, a past Vice-President has also presented his portrait, which will be highly valued.

The Committee much regret to have to record the loss by death during the year of a number of esteemed members.

March 2nd. Thomas Hodgkin, D.C.L., Litt.D., was the son of John Hodgkin, a barrister, and an eminent member of the Society of Friends, to which his family had belonged from its beginning. He was known as one of the most distinguished historians of the 19th Century. His great work "Italy and her Invaders" is probably the most learned and sound work on the period of the irruption of the Barbarians into the Roman Empire that has ever appeared. He joined the Polytechnic Society in 1866, was Vice-President from 1888 to 1890, and President in 1910 to 1912. In 1912 after his term of office as President, he was again elected Vice-President. His presidential address on "Cornwall and Brittany" delivered in 1910, was one of the most interesting that has ever been given to this Society, dealing as it did with the historical period which he knew so well. In 1867 he contributed a paper on the Roman brass coins (nearly a thousand in number), found on Pennance Farm, near Falmouth, and now in the possession of Mr. Robert Fox. He considered that the coins were buried between August and September, A.D. 306. In 1894 at his suggestion Lectures were delivered under the auspices of the Society. The series was commenced with one by himself on the Roman Wall. This was a subject on which he specialised, and on which he was one of the leading authorities. The versatility of his genius (apart from his special subjects of History and Literature) was made apparent by the great interest he took in the objects your Society has ever strenuously promoted. The memory of his personality at your Meetings and addresses as President will, it is believed, be long cherished by the Members of the Society. A short "appreciation" of his work by Mr. Henry Jenner will appear in the Annual Report.

April 4th. James Tangye was one of the most eminent Engineers that Cornwall has produced; he was the Founder of the well-known firm of Tangye Bros., and became identified with the Society as far back as 1860. He was a very successful inventor, and did much to improve the Steam Engine, and often sent exhibits to your Exhibitions. He was one of the first to introduce the Motor Car, and as far back as 1862 he had a reliable Steam Car, and ran it on the roads until he was stopped by Act of Parliament under the Traction Engine Act. Although he retired from his firm many years ago, he was actively engaged almost up to the time of his death in his private workshop, chiefly in improving the Steam Pump; he always took a kindly interest in your Society and keenly appreciated its work in encouraging invention.

March 19th. W. Ayerst Ingram was a member since 1889, and Vice-President 1902 to 1904. An artist of high repute, he was a frequent exhibitor at your Exhibitions, and for many years acted as one of the Art Judges. His services were much appreciated.

May 19th. Sir St. Aubyn Hender Molesworth became a member in 1875, and regularly attended your Meetings and Exhibitions. He held the office of Vice-President from 1887 to 1889.

June 20th. Francis Fox Tuckett, F.R.G.S. joined the Society in 1849, and was its oldest member, having been connected with it for 64 years, and his father, Mr. Francis Tuckett, became a member just after the Society was formed in 1833; a very remarkable record. He was one of the very early members of the Alpine Club. For his explorations in the Italian Alps, King Victor Emmanuel II conferred on him the decoration of Cavaliere di SS. Maurizio e Lazzaro. He was a pioneer in scientific Alpine exploration and undertook a careful triangulation of the Dauphiné Alps, a work of considerable hardship and endurance, which strained even

his unusual physical powers. He was an ardent antiquarian and a great traveller, and his well stored mind enabled him to impart accurate information with much charm. His mother was a sister of the late Robert Were Fox, F.R.S., and while yet a boy, he won a Polytechnic prize for a chart of isothermal lines. He was Vice-President 1887-1889.

August 9th. J. Spencer Churchill joined the Society in 1912 when he came to reside at Falmouth.

Nov. 6th. Sir Wm. H. Preece, K.C.B., F.R.S., was a honorary member from 1882. He was a renowned electrician and was more particularly connected with the electric telegraph, and his inventions and improvements helped considerably to perfect this system. For many years he was chief electrician, and afterwards consulting engineer to the General Post Office. Besides being a scientific man, he was an ardent Celticist, and took a keen interest in the Celtic Association, of which he was a Vice-President. He was the President of the Society during 1901-1904, and his presidential addresses on Terrestrial Magnetism and other subjects will be long remembered by all those who had the privilege of hearing him. He was especially interested in the magnetic work of your Observatory, and was the Chairman of the Falmouth Magnetographs Committee of the British Association for several years.

Nov. 11th. Rev. Philip Carlyon was a member from 1900, and Vice-President 1905-1907. He was spared to reach the wonderful age of nearly 102, and was loved and respected by all who knew him. He always took a warm interest in your proceedings, and until the last few years regularly attended the Meetings of your Society.

Nov. 25th. Sir Robert S. Ball, LL.D., F.R.S., was elected honorary member of the Society in 1907. He was one of the most eminent Astronomers of his time, a great lecturer and

writer on the subject, and did much in making the science popular with the public.

Dec. 1st. Carew Davies Gilbert, of Trelassick, Cornwall, and the Manor House, Eastbourne, was the head of the third generation of a family who have been strong supporters of this Society. His grandfather, Davies Gilbert, F.R.S., who followed Sir Humphrey Davy in the presidential Chair of the Royal Society, was the Vice-Patron of the Royal Cornwall Polytechnic Society for the first six years of its existence. Carew Davies Gilbert followed in the steps of his ancestors in his close association with the Society, which he joined in 1885, and he was Vice-President 1885-1888. He always liberally supported it, and whenever possible took an active interest in its proceedings.

It will be your duty to elect five Vice-Presidents in the room of Col. the Hon. H. W. F. Trefusis, Col. Courtenay B. Vyvyan, C.B., E. B. Beauchamp, Edward Kitto, F.R.Met.Soc., who retire by rotation, and Thomas Hodgkin, D.C.L., Litt.D., who has died during the year. Your Council recommend the following gentlemen for election:—the Lord Bishop of Truro, George T. Holloway, F.G.S., M.Inst.M.M., Bedford McNeill, F.G.S., M.Inst.M.M., T. J. Stephens, F.G.S., Percival D. Williams.

Mr. W. E. Little having left the district, the office of Hon. Treasurer becomes vacant, and Mr. E. P. Kestin is recommended for election to this office.

The following names are recommended for election as Honorary Members:—Robert Simpson Woodward (President of the Carnegie Institution of Washington), Ph.D., LL.D., Sc.D., Clement Reid, F.L.S., F.G.S., F.R.S.

The following gentlemen are recommended to be added to the Council:—Messrs. W. J. Nicholls, D. H. Shilson, H. W. Higman, C. H. Shackell, H. Stocker, J. W. Higman, J. H. Coath, Bedford

McNeill, G. T. Holloway, J. H. Cordner James, Prof. H. Louis, A. G. Charlton and Walter Reid.

The financial position is satisfactory, the year closed with a small balance in hand on Current Account, a substantial amount on Deposit, and no liabilities.



The Librarian's Report.

IN most respects the Library has gone on much as in past years.

Some new books have been bought, the usual exchanges and donations have been made, and the arranging and cataloguing has been kept of up. 'The change of care-taker in 1913 necessitated a change of sub-librarian, for it has been the practice for the care-taker to "double the parts." There does not seem as yet to be any reason to regret the change. The new care-taker is not like his predecessor, a trained library assistant, but he seems to do what is required of him quite well by the light of nature.

The most noteworthy purchase during the year has been rather an expensive one, a complete copy of the six-inch Ordnance Survey for Cornwall, of the latest edition. As far as can be ascertained, this is the only complete copy in the county, though of course, there must be a large number of the sheets of it in both public and private libraries. Our copy, which cost about £15, has been mounted on cardboard, and will be arranged in the drawers of a cabinet, so as to be easy of access with the help of the framed key-map. It has been decided by the Executive Committee that it is better not to allow any of the sheets to be taken out of the Library, for fear of spoiling the set by loss or damage, but Members of the Society, and persons introduced by Members, will be welcome to make use of the maps here. The six-inch Survey, though not the largest scale, for there is a twenty-five-inch one, and a still larger for towns, is really the most generally useful, for it contains all the names of roads, paths, etc., that are found in the twenty-five-inch, and is less cumbersome to use. This is a very important addition to the Library.

Another noteworthy purchase is a copy of "The Parochial History of Cornwall," published by Lake, of Truro, in 1867 to 1872. This book is steadily getting scarcer and scarcer, and its price is therefore going up. It ought to be republished and brought up to date, and in many ways it is capable of improvement, though it is a very useful book, and certainly the best of its kind. It is not very likely that it will ever be reprinted, and we were lucky to be able to get a nice copy at a very moderate price. We ought to make a point of securing all the books on Cornwall that we can. Another interesting purchase is a copy of the "Scientific Papers" of John Couch Adams, the celebrated Cornish astronomer, published in two volumes in 1896.

Various learned Societies and Institutions, British, Colonial and American, have presented copies of their publications as usual, and among donations especial mention may be made of the gifts from the Trustees of the British Museum of valuable publications of the Natural History Departments, and of a copy of "Memorials of James Watt," by C. Williamson, published in 1856, which was presented by Mr. George Tangye. To these donors and others, the best thanks of the Society are due.

A full list of additions to the Library, whether donations or purchases, will appear in the Annual Report.

It was mentioned last year in the Librarian's Report that suggestions from specialists on various subjects as to the purchase of books would be gratefully received. That remark is repeated now, because the Librarian has not had many opportunities during the past year of showing gratitude in that respect. But perhaps it was just as well, for we could hardly have afforded to spend much more on books this year than we have. The purchases that have been already mentioned swallowed up a large proportion of the funds which could reasonably be devoted to the Library, though it was certainly worth while.

List of Additions to the Library.

GOVERNMENT AND OFFICIAL:—

Australian Museum: Records, vol. ix, no. 3, 4; vol. x, nos. 1 to 6.
Report, 1912.

Board of Agriculture: Journal, 1913.

British Museum (Natural History):

Catalogue of Lepidoptera Phalænæ, vol. xii. (text and plates).

„ „ Chaetopoda; A. Polychæta, pt. 1. Arenocolidae.

„ „ Mammals of Western Europe.

„ „ Birds' Eggs, vol. 5.

„ „ Indian Big Game, Hume bequest, 1913.

„ „ Marine Reptiles of the Oxford Clay, pt. 2.

„ „ Ichneumonidæ, pt. 2.

„ „ British Species of Pisidium, recent and fossil.

„ „ Ungulate Mammals, vol. 1.

„ „ Talbot's Nigerian Plants.

Guide to the Exhibition of Specimens illustrating the Modification of the Structure of Animals in relation to Flight.

Canadian Department of Mines:

Annual Report, 1911.

Summary Report, 1912.

Preliminary Report on Mineral Production of Canada, 1912.

Building Stones of Canada, vol. 1, 1912.

Magnetic Iron Sands of Natashkwan, Quebec, 1912.

Economic Minerals and Mining Industries of Canada, 1912.

Canadian Geological Survey:

Memoir No. 17. Geology of Larder Lake District.

„ „ 33. Geology of Gowganda Mining Division.

„ „ 35. Reconnaissance along the National Transcontinental Railway.

„ „ 37. Portions of Atlin District, Brit. Col.

Cape of Good Hope: Department of Mines:

16th Annual Report of the Geological Commission, 1911.

United States Geological Survey:

33rd Annual Report, 1912.

Bulletins 471, 501 to 503, 510 to 515, 518 to 529, 530 to 537.

Geological Folios, nos. 183, 184, 186.

Mineral Resources, 1911, 2 vols.

Monographs, no. 51, 2 pts.

Professional Papers, 71, 77 to 80, 85.

Water Supply Papers, 259, 281, 283, 284, 289, 290 to 294, 296 to 305, 307, 308, 310 to 318.

United States National Herbarium:

Contributions: vol. xvi, pts. 4 to 6, 8, 9, 12, vol. xvii, pts. 1 to 3.

United States National Museum:

Bulletins, nos. 79 to 81.

Proceedings, vols. 42 to 44.

Annual Report, 1913.

Victoria Geological Survey:

Report of Progress, nos. 2, 3.

Western Australia Geological Survey:

Bulletins, nos. 42 to 47, 50.

SOCIETIES, ETC.:—

American Geographical Society: Bulletins, vol. xlv, 1 to 12, 1912.

American Historical Association: Annual Report, 1911, vol. 1.

- American Philosophical Society*: Proceedings, vol. li, nos. 207 to 209, vol. lii, 210, 211.
- Ashmolean Natural History Society of Oxfordshire*: Proceedings and Report, 1912.
- British Association*: Year Book for 1912.
- Cambridge University Library*: Reports for 1909 to 1911.
- Cardiff Naturalists Society*: Transactions, vol. xlv, 1912.
- Carnegie Institute of Washington*: Dept. of Terrestrial Magnetism, Report, 1912; Land Magnetic Observations, 1905 to 1910.
- Chemical Society*: Proceedings, vol. xxix, nos. 419 to 422; Journal, Oct. 1913.
- Chicago Field Museum of Natural History*:
Anthropological Series, vol. xii, nos. 1, 2, xiii, No. 1.
Botanical Series, vol. ii, no. 8.
Geological Series, vol. xiv, nos. 2, 3.
Ornithological Series, vol. i, no. 7.
Report Series, vol. iv, no. 3.
Zoological Series, vol. vii, no. 7.
- Devonshire Association*: Report and Transactions, vol. xlv, 1912.
- Geological Society of London*: Abstracts of Proceedings, nos. 929 to 945, 1912-13.
- Institution of Mechanical Engineers*: Proceedings, 1912, nos. 3, 4; 1913, nos. 1, 2. List of Members, By-laws, etc., 1913.
- Institution of Mining and Metallurgy*: Bulletins, nos. 101 to 104, 110, 111. Presidential Address, March, 1913.
- Junior Institution of Engineers*: Journal and Transactions, vol. xxii, 1911-12.
- Manchester Literary and Philosophical Society*: Memoirs and Proceedings, vol. lvii, pt. 1.

- Mining and Geological Institute of India*: Transactions, vol. vii, pt. 4, (June, 1913), vol. viii, pt. 1 (August, 1913).
- National Electric Lamp Association, Cleveland, Ohio*: Abstract Bulletin, vol. i, no. 1.
- New York Academy of Sciences*: Annals, vol. xxii, pp. 161 to 337.
- North of England Institute of Mining and Mechanical Engineers*: Transactions, vol. lxii, pts. 8 to 10, vol. lxiii, pts. 1 to 7, vol. lxiv, pt. 1. Annual Report, 1912-13.
- Nova-Scotian Institute of Science*: Proceedings and Transactions, vol. xii, pt. 4.
- Photographic Journal*: vol. liii (1913).
- Plymouth Institution*: Annual Report of Transactions, vol. xv, pt. 2, 1910-11.
- Rochester Academy of Science*: Proceedings, vol. v., pp. 39-58.
- Royal Astronomical Society of Canada*: Journal, vol. vi, Nos. 3 to 7; vol. vii, nos. 1 to 3.
- Royal Geological Society of Cornwall*: 99th Annual Report.
- Royal Dublin Society*: Scientific Proceedings, vol. xiii, nos. 27 to 39, and index; Economic Proceedings, vol. ii, no. 6.
- Royal Institution of Great Britain*: Proceedings, vol. xx, no. 105.
- Royal Irish Academy*: Proceedings, vol. xxx, Series A, nos. 5, 6; Series B, nos. 3 to 5; Series C, nos. 12 to 21, vol. xxxi, Clare Island Survey, nos. 3, 25, 33, 34, 42, 45, 61, 62; vol. xxxii, Series C, nos. 1 to 5.
- Royal Society*:
Proceedings, Series A, vol. lxxxvii, no. 599; vol. lxxxviii, nos. 600 to 608; vol. lxxxix., nos. 607 to 612; Series B, vol. lxxxvi, nos. 585 to 590, 593; vol. lxxxvii, nos. 592 to 594.
Year Book for 1913.
The Two Hundred and Fiftieth Anniversary of the Royal Society.

Royal Society of Arts: Journal, vols. lxi, lxii. (1913).

Smithsonian Institution:

Miscellaneous Collection, vol. lvi, title and contents; vol. lvii, nos. 11, 12; vol. lix, no. 19; vol. lx. nos. 15 to 29; vol. lxi, nos. 1 to 14, 16, 17, 19, 20; vol. lxii, no. 1; vol. lxiii, nos. 3 to 5.

Annual Report, 1911-12.

Annals of the Astrophysical Observatory, vol. iii.

Opinions on Zoological Nomenclature, nos. 52 to 56.

South Wales Institute of Engineers: Proceedings, vol. xxviii, Nos. 5, 6; vol. xxix, nos. 2, 4, 5; Index to papers, vols. xxvi to xxviii.

Toronto University Studies: Geological Series, no. 8, 1913.

University College, London Library: Catalogue of Periodicals, 1912.

METEOROLOGICAL PUBLICATIONS:—

Greenwich Magnetical and Meteorological Observations, 1912, 1911.

Meteorological Office: Hourly Values from Autographic Records, 1912.

„ „ Daily Readings of Meteorological Stations of the first and second orders, 1912.

„ „ Geophysical Journal, 1912.

Meteorological Service of Canada: Report for year ending Dec. 1909.

Observatorio Meteorologico-Magnetico Central de Mexico: Boletin Mensual, 1913.

Royal Meteorological Committee: Report, 1913.

Royal Observatory, Hongkong: Monthly Meteorological Bulletin, 1913.

New York Meteorological Observatory: Hourly Relative Humidity per cent., 1913; Hourly Maximum Wind-force in pounds per square foot, 1913.

MISCELLANEOUS :—

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The Works of William Hogarth, with descriptions by J. Trusler.
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James A. Picton, 1883. Presented by the Falmouth
Public Subscription Library.

Report of the Joint Meeting of Scientific, Mining and Engineer-
ing Societies, Cornwall, July, 1912. By E. W. Newton,
Esq., F.G.S. Presented by the Author.

Catalogue of Egyptian Antiquities. By Robert de Rustafjaell.

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The Summer Meeting, 1913.

THIS Summer Meeting was most successful and consisted of two interesting Excursions, besides the usual Art Exhibition.

The first day's Excursion to St. Mawes, St. Anthony in Rose-land, and Gerrans, was on Tuesday, July 15th. The day was fine, though there was rather a cold wind. The party assembled at the Docks, Falmouth, at 10.25 a.m., but owing to a misunderstanding with the steamboat company, there was a regrettable delay in starting, and the arrival at St. Mawes was about half an hour late. The party consisted of the Rev. Canon Fox Harvey, the Rev. J. Byre, the Rev. A. H. Wood, Colonel Faulkner-Brown, Captain Arthur Rogers, R.N., Captain J. S. Henderson, Messrs. F. J. Bowles, R. H. S. Henderson-Bull, L. St. G. Byne, F. D. Bain, J. E. Brown, J. C. Cann, W. Ll. Fox, F.R.Met.Soc., H. Jenner, F.S.A., E. J. Moseley (Assistant Secretary), E. W. Newton, F.G.S. (Secretary), C. Phillips, R. Rabling, R. B. Rogers, F. J. Stephens, Mervyn J. Stewart, Herbert Thomas, J. Collette Thomas, Mrs. F. J. Bowles, Mrs. Henderson-Bull, Mrs. Byne, Mrs. F. D. Bain, Mrs. J. E. Brown, Mrs. J. C. Cann, Mrs. W. Ll. Fox, Mrs. H. Jenner, Mrs. E. W. Newton, Mrs. R. Rabling, Mrs. A. Rogers, Mrs. F. J. Stephens, Mrs. A. H. Wood, Miss Barclay, the Misses Fox, the Misses Mills, Miss Newton, Miss Phillips, and the Misses Thomas.

St. Mawes Castle was explored under the guidance of Gunner Tipping, who was in charge of the Castle, after which the party assembled in the main room, where Mr. F. J. Stephens read a paper on "The Governors of St. Mawes Castle," which is printed in the Report. Returning to the landing-place the party crossed

in boats to St. Anthony in Roseland, and was welcomed at Place House by Mr. J. S. Spry, who showed them the various interesting treasures of his mansion. A paper on the doings of Admiral Spry was read by Mr. F. J. Stephens, and the party adjourned to the Church of St. Anthony, which joins on to Place House. This building, once the church of a small convent of Augustinian Canons Regular, dependent on the Priory of Plympton, is of the 12th and 13th centuries, and, unlike most Cornish churches, was not remodelled in the 15th century. The nave is of the earlier period, and though new windows were inserted in the 13th century, the beautiful and interesting south door is a good specimen of Norman work. The church as it at present stands, that is, after the 13th century chancel and transepts were built, was dedicated by Bishop Branscombe of Exeter on October 3rd, 1259. It is probably the only complete 13th century church in Cornwall. In the churchyard is an interesting stone coffin, probably that of one of the canons. The church contains a large number of monuments of the Spry family.

Carriages were waiting outside the churchyard to take the party by what proved to be a very beautiful drive to Trewince (the Town of the Wind), where they were received by Mr. J. Collette Thomas. After going over the beautiful grounds of Trewince, and enjoying the views for a time, which the delay in starting from Falmouth had rendered all too short, the party proceeded to Portscatho, (the Harbour of Ships) where, in the excellent Public Hall which he himself had built, Mr. Collette Thomas hospitably entertained them to luncheon. It casts a sadness on the memory of that day that our kind host has since been taken from us.

After luncheon the party proceeded to Gerrans Church, which was shown to them by the Rector, the Rev. A. H. Wood, who pointed out the various objects of interest. This is one of the thirteen old churches in Cornwall which have spires, an unusual

feature in so windy a country. Though enlarged in the 13th century and re-consecrated in 1262, it presents at present the aspect of a 15th century church. It was, however, restored and very much re-built in 1848-9. The tower and octagonal stone spire were built in the 15th century. The font is Norman, and there are some interesting bench-ends and other carvings, and there is a good early cross in the churchyard. The registers, which go back to the unusually early date of 1538, though the present existing books are 17th century copies of originals which have perished, contain many entries of interest. The view from the churchyard is a very fine one, over a wide extent of sea and rocky coast.

At Gerrans the party divided itself into two parts. It had been intended to visit Roseteague and Dingerein, but it was found that there was not time for both. So about half the party went to Dingerein, the remains of a more or less circular ancient fort, which is associated by its name with one of the Geraints who were kings of Damnonia. There is not very much left of it now, only a rampart and ditch of a small segment of a circle, but if it is rightly identified with the "Dingerein" mentioned in the Life of St. Teilo in the *Liber Landavensis* as the residence of King Gerennius, and as the "Dinnurin" from which Kenstec, Bishop of the Cornish, wrote in 865, it has great historical interest. Here Mr. Henry Jenner read a paper on "Dingerein and the Geraints," which will be found later in the Report.

The rest of the party inspected, under the guidance of the Rev. A. H. Wood, the interesting house of Roseteague. This is an old manor-house, the history of which can be traced to the reign of Elizabeth, when it belonged to Reginald, son of Sir William Mohnn, a captain under Sir Walter Raleigh. It passed successively to the families of Kemp, Harris and Hartley, and is now the property of Mr. L. Van Grutten, who is the great-nephew of the late Mr. William Henry Harris Hartley. The

walls of the main building and a portion of the north-east wing are part of the old building, as is shown by several of the windows. The oldest architectural feature is a doorway leading to the present kitchen, which was once an outside door of a still older building. Early in the 18th century the house was altered, a new wing being added on the south-east side, and the opposite wing being re-modelled to match the new one. There is a fine ceiling, as well as some good panelling of this period, in the drawing-room. There is a tradition of an under-ground passage to the sea-shore, but no trace of this has been discovered. The old gardens are very well laid out in formal style, and there is a summer house with some curious carvings of apparently German provenance. There is a well at Roseteague known as the "Nun's Well," the name of which has given rise to the idea that the place was once a convent of nuns. There does not appear to be any evidence of this, and it seems more probable that the well is called after St. Nonna or Nun, the mother of St. David, the patroness of Alternun and of Pelynt, and the sister of St. Wenn, who was the wife of Selyf or Salamon, eldest son of the first King Geraint or Gerrans. There was a chapel of St. Nun in Creed; not far off is the parish of her nephew, St. Cuby, and St. Just, the adjoining parish to Gerrans, is called after Jestyn, the brother of Selyf. There are other wells called after St. Nun in Cornwall. The name of Roseteague signifies, very appropriately, "the fair heath" (ros tek).

After leaving Dingerein and Roseteague the party re-assembled at Percuil or Porthcuel, (probably *Porth cul*, the narrow creek), where the steamer "Princess Victoria" was waiting to take them back to Falmouth. Tea was provided on board, and after a short cruise in the harbour, the party arrived at Falmouth Docks in good time for the 7 p.m. train.

The second day was given up to an exhibition of work by students of the various art schools under the control of the

County Council. The exhibition was organised by Miss Bruford, art mistress of the Liskeard School, and also county art organiser of the County Art and Elementary Schools. In this work Miss Bruford was assisted by Mr. A. E. Rendle, A.R.C.A. The exhibits amounted to 255, and were from the following schools :— Falmouth 33, Truro 49, Liskeard 31, Penzance 42, Bodmin 2, Hayle 2, Newquay 4, Redruth 38, Camborne 23, and Helston 11. The collection embraced a wide range of subjects (both commercial and artistic), there being a noticeable increase in the number entered in the former class.

In addition to the work shown by the students at the County Council Schools, there were also exhibited about fifty water-colour paintings by Mrs. Henry Jenner, being sketches made by her in Switzerland, Scotland, Dalmatia, Italy, Cornwall, Kent and Middlesex, paintings by Mr. Rendle, A.R.C.A., and Irish crochet work by Miss Elise Murdoch, of Camborne.

The judges of the competition were Mr. J. Noble Barlow, of St. Ives, and Mr. Leonard H. Pownall, of Falmouth, who in their report state that the exhibition was decidedly above the average, considerable improvement being shown in the drawings from ornamental casts and still life. These formed an excellent class. Drawings from natural plants were highly creditable and good lettering was being well followed up. The embroidery and needle work formed a small section, but deserved commendation. Paintings from still life were not more numerous than in former years, but the work was well done. Wood carving and copper carving were not above the average.

The awards were as follows :—

Silver medals.—Ida Bennetts and Florence Eustice, Camborne ; L. James and J. C. Middleton, Redruth ; A. Christian, Truro ; M. Deacon, Liskeard ; V. E. W. Nation, Falmouth ; G. M. Parsons, Penzance.

Bronze medals.—May Ellis, Adelaide Jago, Camborne; G. Goldsworthy, A. M. Bell, Redruth; H. Bryant, A. Christian, H. C. Cornelius, H. Cock, Truro; M. L. Venning (2), Liskeard; C. G. Tresidder, M. Barton, D. G. Downing, Falmouth; Alice M. Knight, Penzance; L. F. Fowler, Newquay.

Diplomas of merit.—C. Gardenner, F. Eustice, Q. Bennett, G. Bond, Camborne; E. J. Gill (4), M. Clark, G. Jarvis, Redruth; A. E. O. Hicks, H. Bryant, T. McLean, B. Mitchell, M. Polkinhorn (2), M. Prior, J. C. Vage, Truro; A. Martin, M. Deacon (2), Liskeard; Q. Trezise, Helston; V. E. Nation, C. Tresidder (2), E. Trevena, Falmouth; A. Nicholls, G. Mitchell, V. Collins, L. Wilton, Penzance; B. Luke, Hayle; A. Cook, Newquay.

In the afternoon a small attendance gathered in the Committee Room, when the Chair was occupied by Mr. W. L. Fox, Chairman of the Observatory Committee.

After welcoming the members, the Chairman read a paper by Professor Henry Louis, of Newcastle, on "Accurate Dialling."

The paper stated it was very well known that for the majority of underground surveys the simple miner's dial possessed great advantages. The author wished it to be understood, however, that the statement referred to loose needle dialling, and when there was need for work of sufficient accuracy to demand the use of the vernier the theodolite should always be employed. It was obvious that if the Observatory at Falmouth could be put to a use similar to that of the Magnetic Observatory in the Westphalian Coal Field great advantage would accrue, and he suggested that the mines could arrange with the Royal Polytechnic Society to have the curves of magnetic declination sent to them regularly. This would enable accurate surveys with the loose needle to be made in Cornwall, and would lead to greater simplicity, economy, and accuracy in underground surveys. The cost of distributing such reproductions of declination curves should be but small, and the experiment appeared to the writer to be very well worthy of trial.

The Chairman said he had to report that the Magnetic Observatory closed on June 30th, so that the suggestion in the paper of the Falmouth Observatory being used to distribute records of the observations fell to the ground. Their instruments had been working continuously for 25 years and they had a complete record extending over the whole of the period showing the declination which had taken place. He proposed that they thank Professor Louis for his paper, and inform him that steps were being taken to circulate the observations amongst mines.

Mr. Henry Jenner seconded, and the resolution was carried unanimously.

A letter was read from Mr. W. Thomas, of Camborne, agreeing with the need for accurate dialling and concurring that it would be very valuable for the magnetic observations to be circulated amongst mine managers.

In consequence of this paper a request was made to the Society to circulate among its members and others likely to be interested particulars relating to the declination of the magnetic needle at Falmouth. A Table for 25 years, 1888 to 1912, was drawn up by Mr. Wilson Ll. Fox, and will be found elsewhere in the Report.

On the third day of the Summer Meeting, the second Excursion, on Thursday, July 17th, was to St. Michael's Mount, Chysauster, Castle-an-Dinas, the St. Ives Consolidated Mines and St. Ives. On this occasion there was a very successful innovation, the employment of motors instead of horse vehicles. A large motor omnibus was hired from the Falmouth and Penryn Motor Company, and Mr. T. B. Bolitho, Mrs. T. Robins Bolitho, Mr. George Harris and Mr. L. A. Hards were kind enough to lend motor cars for the occasion. Thus it was that there was ample accommodation for the whole party, and the ground intervening between the places visited was got over very quickly. Thus a good deal longer programme was got in than would have been possible with ordinary carriages. It was also a great convenience

for the Falmouth members of the party that they could leave home at 8 o'clock, and proceed to Marazion in the motor omnibus, instead of taking a rather harrassing train journey which must needs begin at 7.9. No doubt the use of motors was more expensive, but every one agreed that the added convenience was worth the extra expense.

The party consisted of Captain J. S. Henderson, Captain Arthur Rogers, R.N., Messrs. F. J. Bowles, R. H. S. Henderson-Bull, J. C. Cann, Caspell, W. Ll. Fox, L. A. Hards, G. Harris, Henry Jenner, J. C. Keast, E. J. Moseley (Assistant Secretary), E. W. Newton (Secretary), Garnet Newton, Thurstan Peter, C. Phillips, Rendle, G. Rickard, R. B. Rogers, W. W. J. Sharpe, Mervyn J. Stewart, and Rupert Vallentin, Miss Barclay, Mrs. Bowles, Mrs. Henderson-Bull, Mrs. J. C. Cann, Mrs. G. H. Fox, Mrs. W. Ll. Fox, Mrs. H. Jenner, Miss Jewell, the Misses Mills, Mrs. E. J. Moseley, Miss R. Newton, Miss Peter and Miss Phillips. The day was fine and not too hot, and the tide exactly suited for the excursion to the Mount. The party assembled at Marazion town at about 9.45, and proceeded at once to cross by the causeway to St. Michael's Mount. The first part visited was the Chapel, where a paper was read by Mr. H. Jenner on the alabaster carvings in the reredos. This paper appears in the Report. Then, by the kindness of the President, Lord St. Levan, the whole house was inspected, including even the new portion, wherein are many interesting portraits, including one, painted from life by Opie, of the old fishwoman, Dolly Pentreath, the reputed last Cornish speaker. An adequate history of this wonderful place yet remains to be written, and it is impossible to do justice to it within the necessary limits of a report of a Polytechnic Excursion. There seems little reason to doubt, from the name "Dinsul," the Mount of the Sun, given to it in the 12th century Life of St. Cadoc in Cott. MS. Vesp. A. XIV in the British Museum, that there was once some sort of pagan sanctuary of the Celtic Sun-

God here. This would very naturally be followed by a dedication in honour of St. Michael, for when much of the unobjectionable part of pagan symbolism was taken over, and given a new meaning by Christianity, St. Michael in western Christendom commonly took the place of Apollo or some other Sun-God, especially as the patron of high places. Another and very remarkable name of the Mount, which endured as long as the Cornish language was spoken, was "Carrak Luz en Cuz" (spelt all manner of ways), the Grey Rock in the Wood. The tradition embodied in this name points to the almost certain fact that St. Michael's Mount was once an isolated rock (the result, no doubt, of an eruption of metamorphic rock composed of granite through the killas in an early geological period), which stood in the midst of a forest. Geological investigation has confirmed this by the discovery in the marsh at Marazion of the remains of a submerged forest, and in the Bay on the other side of the Mount there are a large number of oak trees still *in situ*. After a storm, when the overlying sand and alluvium have been removed, the beach is often littered with portions of these submerged trees and seeds, and occasionally the roots can be seen in their original positions. This was very plainly shown after a storm in 1883. The Mount at one time must have been at some considerable distance from the sea, and its changed relative position is due partly to the encroachment of the sea, and still more to a gradual subsidence of the land extending over a long period of time. In 1846 a shaft was sunk in Marazion Marsh, and after it had passed through slime and gravel and peat to a depth of about twelve feet, a layer of white sand and cockle shells of considerable thickness was encountered. Underlying this was a layer of oak and hazel trees in a stratum of hard solid peat, and below all, at a depth of about twenty-eight feet from the present surface of the land, alluvial gravel and tin were found. This subsidence probably took place in the Neo-lithic Age, about the time when

England was separated from the continent. Judging from the known rate of encroachment, Mr. Clement Reid is of opinion that the sea cannot have reached the Mount until long after the Roman period. If this is the case, and the name would imply that the wood was in visible existence when Cornish or its immediate ancestor was spoken, the "Iktis" of Diodorus Siculus, which is stated to have been an island at high tide, cannot have been the Mount.

It is not known when the name of St. Michael was first attached to the Mount. The Apparition of St. Michael "in Monte Tumba," commemorated in the Salisbury Calendar on October 16th, is said by William of Worcester (circ. 1478) to have taken place on the Cornish Mount in 710. In a bull of St. Gregory VII., quoted by the same writer, the name "Mons Sancti Michaelis in Tumba in Cornubia" is used. In the "Annales Cambriae," under 718, one finds the entry "Consecratio Sancti Michaelis Ecclesiae" and in the "Brut y Tywysogion," under 717, the entry "Ac y kyssegrwyd Eglwys Lann Vihangel." Though this may mean one of the many "Llanfihangels" of Wales, it may equally well, considering the date, refer to a church built to commemorate this Apparition. But there is also a story, suspiciously near in date, and adopted as the Legend of the day in the Second Nocturn of October 16th in the Sarum Breviary, which tells how St. Michael appeared in 708 to St. Aubert, Bishop of Avranches, and the result was the foundation of an oratory, which became a great pilgrimage place, and eventually grew into the royal Abbey of Mont St. Michel. Close to that Mount is a lesser one called "Tombelaine," which is clearly a diminutive of "Tombe" or "Tumba." The word "Tumba" is evidently the common Celtic word (Welsh, *twm*, *tom*, *twmp*, Gaelic, *tom*) for a hillock, and is akin to the English *tump*, the Greek *τόμβος*, and the Latin *tumulus*. It may easily have been the name of either or both Mounts. The official epithet of the Norman Mount is

"Sancti Michaelis in Periculo Maris." Even before the date of the alleged Apparition there may well have been some sort of religious establishment on the Cornish Mount. St. Cadoc and St. Keyna, both of the 6th century, are said to have visited it, and the former is reported to have caused a well of water to spring up there. He may have been the founder of whatever the monastery was, for one need not treat as historical the story that King Arthur built a church there after his successful combat with the giant. Whenever it may have been founded, there seems to have been a religious house, probably of what have been vaguely called "canons," the successors of Celtic monks, when Edward the Confessor settled Benedictines there. Edward's foundation was given to the Norman Abbey of Mont St. Michel by Robert of Mortain in 1085, and continued to be a cell of that Abbey until the confiscation of the alien priories by Henry V.

Henry VI. gave it to King's College, Cambridge, and Edward IV. later handed it over to Syon Monastery at Isleworth, in whose possession it remained till the Dissolution. The fact that the Bridgetine Order, to which Syon belonged, had priories of friars and nuns using the same church, and jointly owning the same property, has caused some confusion, and possession of the Mount has been attributed also to the Gilbertine Order, which had the same peculiarity. The Mount was not only a religious house, for during a great part of the time it was also a fortress, and continued to be used as such down to comparatively modern times. It was besieged on several occasions. Of the present buildings the greater part, including the chapel, is of the 14th century and later, though some parts evidently remain from a building of the 13th or even earlier.

In the rocks on the southern side of the Mount can be seen the outcrops of lodes which are very interesting, and contain fine specimens of tin ore and crystals of topaz.

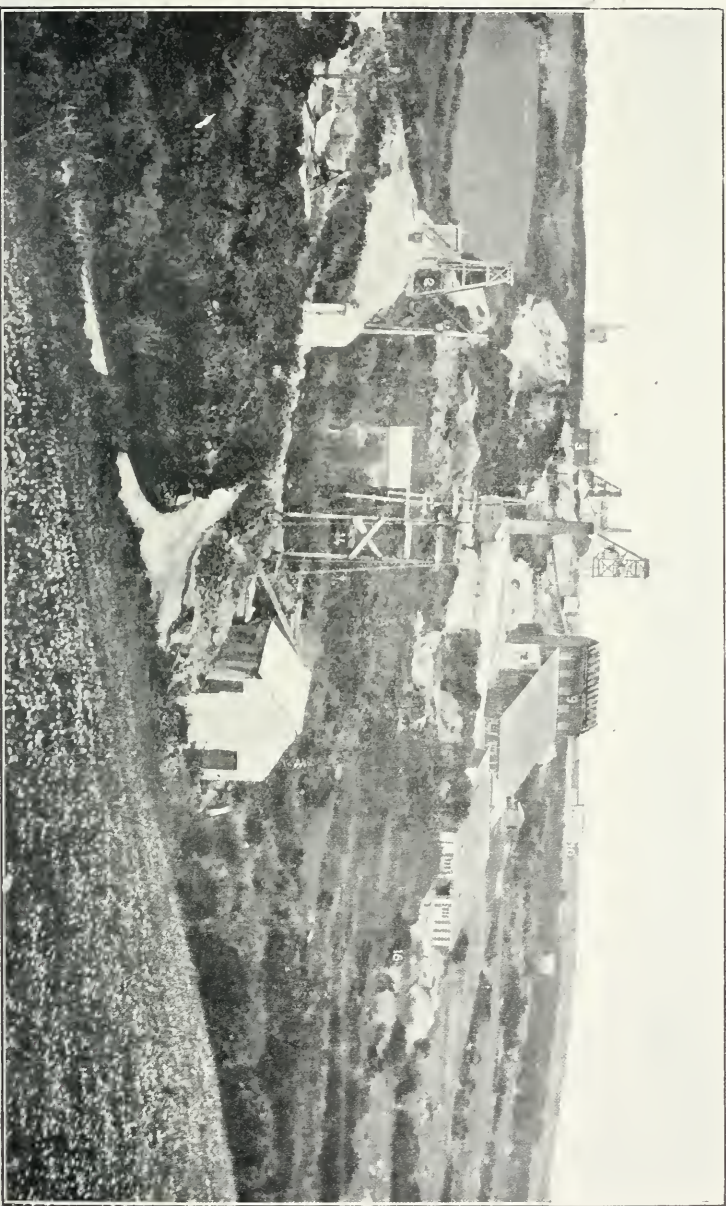
After inspecting the interesting museum at the base of the Mount, the party returned across the causeway to Marazion, where luncheon was provided at the Godolphin Hotel, after which they went in motors to the ancient hut clusters of Chysauster or Chysoister (the House of the Sisters), where Mr. H. Jenner read a paper giving various reasons for supposing that these early dwellings were once a convent of Celtic nuns. This paper appears in another part of the Report.

From Chysauster the party proceeded, some walking across the Downs and others going by motor, to Castle-an-Dinas, a good specimen of an ancient hill-fort. This, though not so large or in so good preservation as the great fortress of the same name in St. Columb, is finely situated in a commanding position, on the highest hill in the neighbourhood, and the view over Mounts Bay and the surrounding country is very beautiful. The fort consists of a circular space of about 250 feet in diameter, surrounded by a double vallum and ditch, much of which is still existing, though no doubt a good deal of the materials was used for the rather foolish tower which was built at the south entrance some time towards the end of the 18th century. There are traces of hut-circles within the area.

The party rejoined the motors at Castle Gate and proceeded by way of Nancledra and Halsetown to the St. Ives Consolidated Mines. Here they were received by Mr. Frederick Cann, the general manager, Mr. Frank Trythall, the chief surveyor, Mr. Caspell, the chief assayer, and Mr. Samuel Taylor, the chief mechanical engineer.

These mines consist of three separate properties, which are being worked by the present Company; Trenwith, St. Ives Consols and The Giew. Trenwith is remarkable for being the only mine in the British Empire which is being worked for pitchblende, from which radium is extracted. When this mine was worked about sixty years ago for copper, this mineral was

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"GIEW MINE."

St. Ives Consolidated Mines Ltd.

mistaken for gray sulphide of copper, and thought to be useless, having no market value. It was consequently thrown away. Now these discarded "dumps" are being carefully searched with the pleasing result that a large quantity of valuable ore is being obtained. Work is also proceeding vigorously underground, and quantities of pitchblende are being found. The ore, after being concentrated at the mine, is carefully packed and sent to the British Radium Corporation's works at Limehouse, London, where it is treated for the extraction of the radium and uranium contents. It is interesting that the radium obtained is of a very high degree of purity, and compares most favourably with that produced on the continent. Considerably over £30,000 worth of radium has already been sold, and the sales of uranium compounds have also amounted to about £5,000. Larger works are under consideration, and these will make it possible to deal with even larger quantities. The lodes pass into the adjoining mine, St. Ives Consols, where they become stanniferous, and in its former working this mine sold about £1,500,000 worth of tin. It was also famous for large separated deposits or pockets of rich ore, called by the old miners "carbonas," for a discussion of which name, see the Report of the Royal Cornwall Polytechnic Society for 1913, p. 153. When one of these was exhausted, it was necessary to keep on developing the mine until another was found. Two of the shafts have now been cleared and electrical pumping machinery installed, and good results may be expected when the unwatering is completed. The Giew mine was re-opened and, although great difficulties were encountered, it was brought to the producing stage in a very short time. Under the capable management of Mr. F. C. Cann, with the employment of up-to-date machinery, it has shown better results than any other of the various mines that have been re-started in Cornwall in recent years, for it has regularly sold about twenty tons of black tin per month for the last two years. The mine contains large areas of

virgin ground and development is going on rapidly, so that it is expected that these amounts will be increased in the future, and in view of this ten more stamps, a large tube mill, and further dressing plant are being erected. The three mines are worked throughout by electrical machinery, the electricity being produced by two separate installations, one at Giew, driven by three Westinghouse gas-engines, and the other at St. Ives Consols, driven by four Diesel oil-engines. The installations can be worked either in conjunction or separately, and are capable of supplying the motive power required in any section of the combined properties.

The visitors were much interested in the powerful machinery which was running so smoothly, and also appreciated very much the collection of mineral products which were exhibited in the assay offices, and shown and explained by Mr. Caspell. These included large specimens of pitchblende, with its associated minerals, uranium oxide, nitrate of uranium, acetate of uranium and sodium uranate. The pitchblende from Trenwith is so radioactive that it is possible to photograph specimens by their own contained light. These photographs are called "radiographs," and a number of these of great scientific interest were shown. There were also specimens of stones recently obtained from the great "carbona" of the St. Ives Consols Mine.

After a most interesting stay at the Mines, the party proceeded to the Porthminster Beach, St. Ives, and a most enjoyable tea, with strawberries and raspberries and cream, was provided at the charmingly situated bungalow of the Secretary, Mr. E. W. Newton. So pleasant was the place that the party were not sorry that the arrangements of trains and motors allowed them to enjoy the view and surroundings until about eight o'clock, and all heartily agreed with Mr. Wilson Fox, when he proposed a vote of thanks to Mr and Mrs. Newton for arranging the luncheon and tea, and generally carrying out a most successful programme.

RADIOGRAPHS.



Specimens of PITCHBLENDE from Trenwith Mine, photographed by
their own rays.

Testimonial to Mr. Edward Kitto, F. R. Met. Soc.

AN Illuminated Testimonial Address was presented, as has been already mentioned in the Report of the Council, to Mr. Edward Kitto by the Committee of the Observatory on his retirement. This was signed by the President of the Royal Cornwall Polytechnic Society, and the members and Hon. Secretary of the Observatory Committee. The wording was as follows.

"The Observatory Committee of the Royal Cornwall Polytechnic Society desire to express their high appreciation of the valuable services Mr. Edward Kitto, F.R.Met.Soc. has rendered during the time that he has been connected with the Falmouth Observatory, a period of over 44 years. From May 1869, he acted as Assistant to the late Mr. Lovell Squire, the superintendent until his retirement in 1882, when Mr. Kitto was appointed his successor.

The constancy, skill, care and accuracy of his work, which have been manifest in both the Meteorological and Magnetical Departments, claim special recognition.

The Committee trusts that Mr. and Mrs. Kitto (the latter having acted as Assistant since November 1890) may long enjoy their well-earned retirement.

Dated at Falmouth, 1st July, 1913."

A reply was received from Mr. Kitto to the following effect.

"The Testimonial is a beautiful piece of work, artistic and harmonious, and so suitably framed. It will be greatly valued, along with the no less beautiful Testimonial of the Royal

Cornwall Polytechnic Society of seven years ago, as an expression of the Committee's appreciation of my services to the Observatory. Pray accept for yourself and convey to the several members of the Observatory the warmest thanks of Mrs. Kitto and myself for this gift, which will be an abiding witness of the happy relationship which for so many years existed between them and ourselves."



Dingerein and the Geraints.

BY HENRY JENNER, F.S.A.

A Paper read at Dingerein in Gerrans, on July 15th, 1913, at the Summer Excursion of the Royal Cornwall Polytechnic Society.

THERE is no doubt that the name "Dingerein" means "the hill-fort of Geraint." There were three Kings of Damnonia, which was Devon and Cornwall, who bore a name of which "Geraint" was the older and "Gerrans" the later Cornish form. The original name was "Gerontius," a Graeco-Latin adjectival form from the Greek root *γέρων*, an old man. It probably had a respectful meaning, just as one gets such words as "senator," and the Romance words "señor," "signore," etc., from the equivalent Latin "senis." But by the time that a possible Briton, Gerontius, the general of the usurping Emperor Constantine, bore it, it had become simply a personal name. Zosimus (Bk. VI.) speaks of him as ἀπὸ τῆς Βρετανίας ὀρμώμενος. There was a 4th century St. Gerontius at Italica, near Seville, and there were between twenty and thirty recorded ecclesiastics of the Eastern Churches who were so called in the 4th and 5th centuries. There are some who think that the above-named Constantine, who was put to death by Honorius in 411, was the same as the Constantine of Geoffrey of Monmouth, and as the Cystennin Gorneu of the Welsh genealogies, whose pedigree is traced back to Caractacus and Bran the Blessed. If he can be identified with the Constantine of Geoffrey, who certainly seems to be meant for the usurping Emperor, Cystennin Gorneu had apparently four sons. The eldest was Constans, who had become a

monk and was taken from his monastery to succeed his father, (which was what happened to Constans, the son of the usurping Emperor, only in his father's life-time, and not in Britain,) and he was killed by Vortigern, as the Constans of the Greek and Roman historians was actually killed at Vienne by Gerontius. The second was Ambrosius, who is the Ambrosius Aurelius or Aurelianus of Gildas, Nennius and Bede, who successfully kept back the Saxons. The third was Uthyr, the father of Arthur, and, according to the Welsh genealogies, there was a fourth, Erbin, King of Damnonia. The son and successor of Erbin was the first Gerontius of Damnonia. We have his name in its early Cornish form "Geraint," but all that we know of him is derived from Welsh sources, principally from two pieces, the prose story of Geraint ap Erbin in the Red book of Hergest, and a poem attributed to the 6th century bard Llywarch Hen, who is one of the best authenticated early bards of Wales. The prose story tells of his adventures as a knight of Arthur's Court, of his wooing and winning of Enid the daughter of Ynywl, and of his subsequent treatment of her. There is a French variant of the story by Chrétien de Troyes, in which his name is given as "Erec," and a German variant of that by Hartmann von Aue. The Welsh and French forms were both used by Tennyson as material for his poem of "Enid." The Welsh poem, of which the original may well have been by Llywarch Hen, though in its existing form it has been much modernised, and can only be traced back to the 12th century Black Book of Carmarthen, is a lament for the death of Geraint at the Battle of Llongborth. There he is called "a brave man from the land of Dyfnaint (Gwr dewr o godir Dyfneint)," that is to say from Damnonia. Nothing else is known of the battle, except that Arthur was present at it, but the date is taken to be about 522, and Llongborth, which means "the Harbour of Ships" has been held to be either Langport in Somerset or Portsmouth. A Welsh triad mentions Geraint ap

Erbin as one of the three Admirals (llyngesog) of the Island of Britain, "and there were six score ships to each admiral, and six score sailor-men to each ship," whereby we may learn that in the sixth century there was a very respectable British navy of 360 ships and 43,200 men. It is curious that another of the admirals was also a Cornishman, March ap Meirchion, who was the King Mark of the Tristan story. In the Gododin poem of Aneurin, which relates to the Battle of Cattraeth, occurs the following mention of Geraint :

Geraint from the South raised the war-cry,
At the White Lake fair was the hole of the shield (that is,
the shield was well pierced)

Ancient was the spear, gentle the ancient one,

Praised on mountain and sea,

[Gereint rac Deheu gawr a dodet

Lluch gwynn gwynn dwll ar ysgwyt

Yor yspar llary yor

Molut mynut mor,]

and about ten lines of "common form" Welsh panegyric. This evidently refers to the Damnonian king, for the poem deals chiefly with events in the North. He is praised on the sea, which points to the admiral of the Triad, and later on he is called "diachor angor ygkyman," an unsurroundable or impregnable anchor in battle, rather a muddled metaphor, but clearly meant to be nautical. The White Lake mentioned in connection with Geraint comes into the wild story of the Three Birds of the White Lake (Tri Adar y Llwh Gwyn) which belonged to Drutwas ap Trephlin. They would do whatsoever he told them, and he sent them out to kill Arthur, with whom he had a quarrel. The sister of Drutwas warned Arthur, who wisely kept out of the way, and the birds, having orders to kill somebody, killed their own master by mistake. There is an idea that they were vultures. This too is probably the lake of which Taliessin speaks :

A pleasant *Caer* there is on a wide lake,
 An impregnable castle surrounded by the sea,
 The point of the Lake of the Son of *Erbin*.
 [*Aduwyn Gaer yssyd ar llydan llyn*
Dinas diachor mor ae chylchlyn
Blaen llyn ap Erbin.]

There is no means of knowing where this lake may have been. If one looks for accurate topography in the poems of early Welsh bards, one is likely to be disappointed, and *Taliessin* is the wildest and vaguest of them all. Is the "*Llyn ap Erbin*" possibly what is now called *Falmouth Harbour*? and is the pleasant castle by any chance meant for the real *Dingerein*? The description is near enough for *Taliesin*.

One more mention is made of *Geraint* in the Welsh poems. In the "*Englynion y Clyweid*," the verses of hearing, triplets each of which begins with "*a glyweisti a gant*" (hast thou heard what sang), is the following verse :

Hast thou heard what sang *Geraint*,
 The son of *Erbin* faithful and true?
 Short-lived is the enemy of the Saints.

(*A glyweisti a gant Gereint,*
Mab Erbin kywir kywreint?
Byr-hoetlauc digassauc seint.)

and he is called elsewhere "*car i saint*," a friend to the saints. It is therefore not improbable that the monastery of *Dinnurriu* or *Dingerein*, of which presently, was founded by him.

Geraint ap Erbin had several sons, *Salamon* or *Selyf*, who succeeded him, married *Gwen*, daughter of *Gynyr* of *Caer Gawch* in *Pembroke*, the sister of *St. Nun*, the mother of *St. David*, and known to us as *St. Wenn*, was the father of *St. Cuby*, and may possibly be *St. Silevan*, whom we now call *St. Levan*, and the "*Silus*" of the inscription in the Church of his brother *St. Just* in *Penwith*; *Cyngar*, who was also a saint, and from whom

Congresbury in Somerset gets its name; Jestyn, who is St. Just; Caw, the father of Gildas and of the Huail whom Arthur slew; Cado, the "Cador of Cornwall" of the Arthur romances, and the father of the Constantine who succeeded Arthur, and became the name-saint of the two Constantines in Cornwall; and Garwy, who is classed with Gwalchmai or Gawain and another Cador as one of the three Lover Knights of the Island of Britain, who "were the best to guest and stranger and most liberal of gifts and kindness." It may be that Geraint the Second was the son of one of these, but on his parentage we have no information. All that we know is derived from another Welsh source, though expressed in Latin of sorts. The form that we have of his name is a re-Latinised version of what the Cornish "Geraint" would become in Welsh, "Gerennius." Welsh does not like the combination *nt* in the middle of a word, and prefers *nn*. Thus *Constantine* becomes *Cystennin*, the Latin *fontana*, which we make into *venton*, becomes *ffynnon*, and for *hanter*, half, of Cornish and Breton, the Welsh say *hanner*. So *Gerontius* becomes *Gerennius*. In the "Liber Landavensis," a miscellaneous collection relating to the Church of Llandaff and its possessions, there is a Life of St. Teilo, the second Bishop of Llandaff. When the Yellow Plague (*Pestis Flava*, *y Fâd Felen*), whatever that may have been, was devastating Britain in the reign of Maelgwn of Gwynedd, who died of it in about 588, St. Teilo, warned by a vision, fled with a large number of his flock to Brittany. On the way he stopped for a while in Cornwall, where he was well received by Gerennius the King. On his departure he promised the King that wherever he might be he would come and give him the Body of Christ when he was dying. When Gerennius was seized with his last illness, St. Teilo became aware of the fact by some miraculous means, and at once set out from Brittany. He ordered his followers to take with them a huge stone coffin, but it was too heavy for them to get

it into the ship, so with the characteristic disregard for gravitation, which has been so common with saints ever since Elisha made the borrowed axe-head to float, he caused it to be put into the sea, and it floated ahead of the ship all the way to Cornwall. On the way they met the messengers of King Gerennius coming to summon the saint. Arrived at the Cornish coast, they landed "in portum vocatum Dingerein," and there St. Teilo found the dying King and gave him the Corpus Domini. Gerennius died and was buried, according to the Life of St. Teilo in the aforesaid stone coffin, but according to popular tradition in a gold boat with silver oars, in the great barrow of Carn Beacon, in Veryan. The barrow was opened in 1855, and a kist-vaen with human ashes was found in it, but no gold boat and no silver oars. The ashes no doubt belonged to a much earlier interment of very prehistoric times, and if King Gerennius was actually buried there, it was probably what is called an "alien burial," in a mound originally made for some one else. It is not certain whether he or Geraint the First is the name-saint of the parish. I am inclined to think that, as probable founder of the monastery here, it was Geraint I. The second Geraint may possibly be the unnamed King of Damnonia who, according to William of Malmesbury, granted land at Ineswitrin, which is Glastonbury, to the Old Church, which was reputed to be that which St. Joseph of Arimathæa had built, and to Worgrez the Abbot, in 601. If the chronology of the Life of St. Teilo may be trusted, he was not, for according to that he died seven and a half years after the departure of St. Teilo to Armorica, which was apparently in the year of the death of Maelgwn, which at the latest was 588.

Of the third Gerontius, or Geruntius, as he is called, I need say but little. I do not know that he ever had anything to do with this place, nor is his relationship to the other two known. Some time before 709, St. Aldhelm, who died in that year, wrote

him a very interesting letter pointing out the error of his ways in the matters of the keeping of Easter, the tonsure of his clergy, and his not very courteous behaviour to the Saxon clergy. In 710 Ina of Wessex and Nun his brother, according to the Anglo-Saxon Chronicle, fought against Gerente, King of the Welsh, which in this case means the Damnonian Britons, and drove them, as we learn from other sources, beyond Taunton. In the same year is said to have occurred "the Great Vision of the Guarded Mount," "the Apparition of St. Michael in Monte Tumba, which according to a bull of St. Gregory VII., dated 1070, quoted by William of Worcester, was our Mount and not the Norman one. These are all the events of the reign of Geraint III. that are known to us.

Once again and for the last time does Dingerein come into history. In about 865 a certain Kenstec writes to Ceolnoth, Archbishop of Canterbury (830 to 870), as follows :

"Ego Kenstec humilis licet et indignus ad episcopalem sedem in gente Cornubia in monasterio quod in lingua Brettonum appellatur Dinnurrin electus, in primis confiteor tibi, sanctissime pater Ceolnode, Archiepiscopo, quod absque dubio credo, etc.

[I, Kenstec, elected, though humble and unworthy, to the episcopal see in the Cornish nation in the monastery which in the language of the Britons is called Dinnurrin, firstly confess to thee, most holy father Ceolnoth the Archbishop, that without any doubt I believe, etc.]

Then follows a confession of orthodox faith, and the letter ends with a declaration of allegiance "sanctae sedi Dorovernensis Ecclesiae," to the holy See of the Dorovernian Church. It is interesting to see that Kenstec uses the old Roman name, "Dorovernum," for Canterbury. Was the old tradition of the name kept up in Cornwall? The Welsh call it now, and probably called it then, as Nennius did, "Caergaint," the City of Kent, a translation of the Saxon name. I think, however, that I

have seen the older name used in some of the grandiloquent charters of the Anglo-Saxon kings. It is also interesting to observe that Kenstec was apparently a monastic bishop of the Celtic type, and his title was taken from the district, not from any cathedral city. This practice survived, and indeed still survives in Scotland in the titles of the Bishops of Argyle and the Isles, Caithness, Murray and Ross, and Galloway, though some of the Scottish dioceses are called after towns.

I do not know by what authority this not very large fortress has been identified with the "Dingerein" of the "Liber Landavensis" and the "Dinnurrin" of Kenstec's letter. I have only been able to trace it back to Whitaker's Ancient Cathedral of Cornwall of 1804. Borlase in 1769 knew nothing of it, and only conjectures that the Dingerein of St. Teilo must have been "somewhere near the church called from this Prince (as 'tis supposed) Gerrans, and gave name to the harbour thence called Dingerein Port." It would seem more probable that the monastery mentioned by Kenstec should have been nearer to Gerrans Church than this is, and the only place just hereabouts that can by any means be called a harbour is Portscatho, which is the sea-port of Gerrans. Portscatho means "the Harbour of Ships," and is in Cornish what "Llongborth" is in Welsh. I do not venture to suggest that it is the scene of the battle at which the first Geraint was killed, but it is a curious coincidence that a place with the same meaning should be here associated with the probable residence of Geraint the Admiral. There are other places called after some Geraint, not necessarily the same one. In St. Columb, not far from that great hill-fort, Castle-an-Dinas, which above all others, as its size and strength would imply, was traditionally the Royal Castle, is "Rosurran" or "Roserrans," the Heath of Geraint. A creek of the Fal, running up to Philleigh, is called "Polgerran," the Pool or Pill of Geraint, and there is a "Killygerran" Head, the Grove of Geraint, or more probably

“Killgerrans,” the Retreat of Geraint, in St. Anthony in Rose-land. This present fort is on the estate called Curgurrell, which probably should be “Cargarrell,” and I think means the Caer or Fort of Carrell, whoever he may have been. This fort is probably the cause of the name. Not far off is Tregeare, the Town of the Fort, and this was the name of that great manor, which from early times was the lordship of the Bishops of Exeter, no doubt inherited from the Diunurin monastery of the Bishops of Cornwall.

Whether this is the real Dingerein or not, there is no doubt that the name means the Castle or hill-fort of Gerrans, and little doubt that the place mentioned in the Life of St. Teilo and the letter of Kenstec was at any rate somewhere in the neighbourhood, so that, even if we cannot be sure of the identification, it is a good peg on which to hang a little Cornish history, to illustrate a favourite theory of mine concerning the amount of history enshrined in our place names.



The Alabaster Carvings in the Chapel of St. Michael's Mount.

BY HENRY JENNER, F.S.A.

A Paper read at St. Michael's Mount on July 17th, 1913, at the Summer Excursion of the Royal Cornwall Polytechnic Society.

IN the reredos of the chapel of St. Michael's Mount there are nine alabaster reliefs of small size in a row. They do not belong to the original building, but have been placed in their present position in quite recent times. There does not seem to be any record of how they came into the possession of the St. Aubyn family.

The three of larger size, one of which is immediately over the middle of the Altar, and of the other two one is at each end of the row, are of English workmanship, and are probably of the early 15th century. The six little tablets along the top of the Altar are of Italian workmanship and are of the 16th century.

The subjects represented are as follows :

1. Larger tablet on the North side. A Bishop vested for Mass stands at an Altar on which is a chalice. Behind him stands a surpliced server, who carries a taper. On one side of the server is the figure of another assistant, who carries a Papal tiara. In a niche in one side of the Altar are two cruets for wine and water. The Bishop's hands are broken off, but the position of his arms, the fact that the server is holding the hem of the chasuble and the presence of the taper show that the moment

represented is that of the Elevation of the Sacred Host. The tiara shows that the celebrant is a Pope. It is clear therefore that the subject is the "*Pietas Sancti Gregorii Magni*" or, as it is commonly called, "The Mass of St. Gregory." The legend, which is not a very early one, is to the effect that St. Gregory the Great (Pope from 590 to 604) had doubts himself, or according to one form of the story, had given Communion to a woman who had had doubts about the Real Presence of our Lord in the Holy Eucharist. He prayed that his or her faith might be strengthened, whereupon, as he was consecrating, he had a vision of Christ surrounded by the instruments of the Passion, or, as some versions of the story have it, he saw the Host change in his hands to a human figure. Probably the latter was represented here. Both forms are common in mediæval art, and it is not uncommon to find an engraving of this subject as a frontispiece to an early printed Missal. It will be remembered that in the Grand Saint Graal, after Christ has consecrated Josephes the son of Joseph of Arimathæa to be the first Bishop in Christendom, the latter says the first Mass, using our Lord's words only. And when he has said "Take, eat, this is My Body," the bread is changed into the body of a Child, whose blood drops into the chalice. There is a similar incident in the Galahad Quest, taking the place in the Castle of Carbenek, the refuge of the Holy Grail. It is fairly clear that legends of this sort were realistic mediæval allegories, put forward at the time of the great controversies on the subject of the moment and effect of the consecration in the Eucharist, which were prevalent in the 11th and 12th centuries.

2. The first of the smaller tablets, beginning on the North, represents the Story of Susanna and the Elders (Daniel xiii, according to the Greek and Latin, but not found in the Masoretic Hebrew, and therefore included in the Apocrypha of the English Authorised Version).

3. The next represents the Adoration of the Magi (St. Matthew ii, 11).

4. Our Lord giving Holy Communion to the Apostles after the Last Supper. This is a very unusual form of this subject, in that it is Judas, carrying the purse, who is kneeling before Christ. There is a 13th century Psalter in the British Museum (Arundel 157, f.8b), which contains a picture of similar sort, and there is another in a late 15th century Breviary of Spanish work, which belonged to Queen Isabel of Castile (B.M., Add. MS. 18851, f. 100).

5. Middle larger tablet. St. John the Baptist's Head in a Charger, with accessories, of which presently.

6. Our Lord washing St. Peter's feet (St. John xiii, 6-10).

7. Another of the Adoration of the Magi.

8. The Sacrifice of Isaac (Genesis xxii).

9. Third larger tablet. Christ before Pilate. Pilate washing his hands (St. Matthew xxvii, 24).

With the exception of the tablet representing the Communion of Judas, there is nothing especially noteworthy in the six smaller tablets. They present the usual conventional treatment of the subjects in the religious art of the 16th century. The selection of the subjects is so devoid of all sequence, that there seems little doubt that five of them are all that remain of a very much larger series, representing, I would conjecture, the Life of Christ with Old Testament types, after the manner of the *Biblia Pauperum* and the *Speculum Humanae Salvationis*. The duplicate of the Adoration of the Magi probably belonged to another set.

The two outside larger and earlier tablets are interesting from their date and English origin, but present no very particular treatment of not uncommon subjects. But the third, that in the middle of the Altar, is of very great interest indeed. It is a remarkably fine specimen of a class of alabaster tablets, once

very common in England, of which a fair number still remain. I have seen a large number of them myself, and in a paper on the subject, read before the Society of Antiquaries in 1890, by Mr. St. John Hope, twenty-seven of them are described. Mr. Hope's conclusions, the reasons for which are too long to go into here, are that they are made of alabaster from the quarries of Chellaston, near Derby, by craftsmen of Nottingham, and that they are all connected with the great York Guild of Corpus Christi, a mediæval Confraternity of the Blessed Sacrament. These tablets represent St. John Baptist's Head in a Charger, surrounded by varying accessories. Below is generally the Holy Lamb, the Figure of the dead Christ standing in the Tomb, which is usually known as the "Eucharistic Ecce Homo," or, as in the present case, our Lady St. Mary with her Child. On either side are usually saints, one of whom is generally St. Peter, the patron of York Minster, and the other an archbishop carrying his cross and a book. Mr. Hope thinks that this is St. Thomas of Canterbury, because the Master and Wardens of the Hospital of St. Thomas, at York, transferred their house to the Guild of Corpus Christi. But as that was not till 1478, and most of these tablets are much earlier, I am inclined to think that the Archbishop is St. William of York, who died in 1154. On some of the more elaborate tablets, such as this, other figures are introduced. In the present case at the top there are three figures, representing the Three Persons of the Holy Trinity. The Father, bearing a globe is on the right, the Son, crowned with thorns, is on the left, and the Holy Ghost, whose emblems have disappeared, is in the middle. Below the figure of God the Son, and above that of St. Peter, is St. Christopher, bearing the Holy Child on his shoulder, and below the figure of the Father, and above that of the archbishop, is St. James the Great, with pilgrim's hat and staff and book. In the base is our Lady, crowned, enthroned, and bearing a sceptre, with her Child, who

carries a globe, on her knee. Persons from all over the country were affiliated to this Guild, and these tablets, as is shown by many lists and inventories, were common objects of private devotion. This was an unusually good and expensive one, and the purchaser probably ordered the introduction of St. Christopher and St. James as Saints to whom he had a special devotion. St. Peter and St. William signified York, and the introduction of the figures of the Persons of the Trinity and of our Lady and her Child does not need explanation. They might be found anywhere. There remains the nucleus of the design, St. John Baptist's Head in a Charger. Why is this found in all these tablets?

I can only conjecture why the symbolism was adopted, but at York, if nowhere else, St. John's Head was regarded as an emblem of the Holy Eucharist, and is therefore appropriate to this Guild. In the York Breviary the fifth and sixth lessons at Matins on the Feast of the Beheading of St. John the Baptist (29th August), have the following passages:—

Caput Johannis in Disco signat Corpus Christi, quo pascimur in sancto altari, et quod ecclesiae gentium tribuitur in salutem ac remedium animarum. Quod autem tulit matri suae, id est synagogae Judeorum, in fine offertur mundi participatio corporis sancti et fides Christi ab ecclesia gentium.

[The Head of St. John in a dish signifies the Body of Christ, on which we are fed at the holy altar, and which is granted to the Church of the Gentiles for the welfare and healing of souls. But that which she brought to her mother, that is to the synagogue of the Jews, at the last is offered by the Church of the Gentiles as the world's participation in the Holy Body and as the faith of Christ.]

I have not yet discovered the author of the Homily from which these lessons are taken. The passages are partly paraphrases of the Gospel story and partly mystical interpretations of it. Herodias, to whom the Head was brought by her daughter, is

likened, as we see from the quotation, to the Jewish Church, to which the natural Body of Christ was first brought. Nothing is said about the old tradition that Herodias pierced the Head with a bodkin. This in many of these tablets, but not in this one, is represented by a wound over the eye. It might have suggested a type of the piercing with the spear. The words of St. John when he showed Christ to his disciples are still used by the priest in the Latin Rite when he shows Him to the communicants, "Ecce Agnus Dei qui tollit peccata mundi" (Behold the Lamb of God, who taketh away the sins of the world). The Agnus Dei or Paschal Lamb, as it is less correctly called, is a common emblem of St. John the Baptist in Christian art, and is one of the badges of the Knights of St. John. These Knights had a house at Landithy, close to Madron Church, and it may be that the "Lamb and Flag" as a tin-stamp originated with them, and not, as Davies Gilbert asserts, in the crest of the Davies family. The arms of Penzance are St. John's Head in a Charger. This is alleged, on no very good authority, to have been "punning heraldry," founded on the supposed meaning of the name of the town, "the Holy Head" or "the Saint's Head," and to have been suggested by King James the First, when he granted the charter in 1614. But is it only a coincidence that the great day of the year there is Corpus Christi Fair?

I have found another curious instance of the symbol of St. John's Head being connected with the Holy Eucharist, which, as far as I know, has never hitherto been recognised as such. In the Welsh form of the Perceval Grail story, the Tale of Peredur in the Red Book of Hergest, which is a much varied form of the "Conte del Graal" of Chrétien de Troyes, there is a remarkable variation which has led many writers to allege a Pagan Celtic origin for the whole story. In Chrétien and in Wolfram's German poem, which professes to derive itself from a certain Kiot, or Guyot, of Provence, and not from Chrétien, though it agrees

with the latter in many points, Perceval on the night when he comes to the castle of the Fisher King sees a vision of the Holy Grail and of a Lance which drips blood. Chrétien does not explain here what the Grail is, but it is elsewhere shown to be the Vessel of the first Eucharist at our Lord's Last Supper. Wolfram, who often misunderstands his authorities, makes it out to be a stone or jewel, but connects it with the Eucharist by telling how its power is sustained by a Dove from Heaven, which every Good Friday places on it a consecrated Host. There is a touch in this which suggests a vague reminiscence of the Epiklesis or Invocation of the Holy Spirit, which effects the consecration according to the Eastern theory, and is found in the Eucharistic Prayer in the Oriental Liturgies, and on some days in the variable "Post Pridie" or sequel to the Words of Institution, in the Gallican and Mozarabic Rites. But that opens up a different discussion. In the *Peredur* Tale, *Peredur*, who is *Perceval*, goes to the Castle of the Fisher King and has the vision, as in the other forms, but though the Bleeding Lance is there, instead of the Grail there is "*dysgyl vawr . . . a phenn gwr yn y ddysgyl, a gwaed yn amyl yn y chylch*" (a great dish . . . and the head of a man in the dish and blood in plenty around it). This has been equated with the Celtic Cauldron of *Dagda* or of *Ceridwen*, with the Head of *Bran the Blessed*, and with other Celtic and Pagan dishes, cups and cauldrons of health and rejuvenation. My friend, the late Mr. Alfred Nutt, built a most elaborate theory on the subject, full of excellent Celtic folk-lore, in a book in which he incidentally attributes to me a theory that the *Peredur* dish was a memory of the *Veronica Kerchief*. This was not my theory, but that of the late Mr. H. L. D. Ward of the British Museum, only I happened to tell it to Mr. Karl Pearson, who quoted it as mine, though as a matter of fact I had said that I did not agree with it. But bearing in mind the connection which the York Guild of *Corpus Christi* and the York Breviary

appear to find, I am much more inclined to see in this dish and head only the Eucharistic Grail in its highly cryptic, and as yet unexplained symbol of St. John's Head in a Charger. Is it only another coincidence that Peredur is the son of Evrawc, which is Eboracum, which is York?

Another not very intelligible connection between St. John and the Eucharistic Holy Grail is found in the Gawain section of the Quest. When Gawain goes to the Grail Castle, he is refused admittance unless he brings with him the sword with which St. John the Baptist was beheaded. This may be connected in idea with that sword which elsewhere in the story is broken and reunited, and that may be compared with a ceremony which is found only in the Celtic and in the East Syrian (Nestorian or Chaldean) Rites, in which the consecrated Host is not only broken, as in other rites, but is also reunited.

The connection of St. John the Baptist with the Grail legend is sufficiently obvious to have been noticed already. Nutt draws sun-myth deductions from it, grounded largely on the fact that St. John's Day is the Summer Solstice. It is noteworthy also that in the Cathedral of St. Lawrence at Genoa the "Sacro Catino," a green glass vessel, brought from Caesarea in 1101, and reputed to be the real Holy Grail, was kept in the chapel of St. John the Baptist, along with his reputed relics, until it was removed in modern times to the Cathedral Treasury. But I think I may claim that this is the first time that the evident symbolism of these interesting tablets has been brought into juxtaposition with the Welsh Grail story. The key is supplied by the passage in the York Breviary, but the reasoning by which it was arrived at is still to be sought. That, however, is not uncommon with mediæval symbolism. There are many cases like this, where the symbolism is beyond doubt, but the process by which it was developed is unknown.

The Hut-clusters of Chysauster.

BY HENRY JENNER, F.S.A.

A Paper read at Chysauster on July 17th, 1913, at the Summer Excursion of the Royal Cornwall Polytechnic Society.

THIS will be a very short paper, for I have no doubt that you have already had quite enough of my papers during these two excursions.

The Ordnance Survey maps and various other authorities describe these interesting remains as "Ancient British Village." *Faute de mieux*, that description will serve; they are ancient, they are British, being certainly in Britain, and they have the appearance of a village. But I am inclined to think that it is rather inadequate.

In his "Age of the Saints" the late William Copeland Borlase pointed out a considerable resemblance between the so-called "bee-hive huts" of Cornwall and certain remains in Ireland, at St. Senach's Island, Magherees, at Inishmurray Cashel and elsewhere, and in the Isle of Man, which seem beyond doubt to be not pre-historic but connected with early monastic establishments. He goes so far as to suggest that the large chamber in this very cluster may have been a church. I think it is possible that I originally pointed this out to him, for the first time I ever saw these remains forty years ago I suggested that the hollow in a stone in the doorway looked very like a receptacle for holy water, such as one finds so commonly in church-porches. In Mr. Baring Gould's supplementary volume to his *Lives of the Saints* there is a ground plan of an undoubted Irish monastic

building at Skellig Michael, off the coast of Kerry, which, though more extensive and elaborate, resembles very much the ground plan of this cluster, the principal characteristic of which is that it consists of a number of small round cells grouped round a central court or hall, and contains certain chambers of larger size than the rest, the whole being enclosed in a thick rampart or wall.

In this case there are two larger chambers, and in the doorway of one of them is set a stone in which is a circular hollow, which is evidently artificial. This has been said to be a hand-mill or quern, but it is in such a position in the jamb of the doorway that it would be impossible to use it as such, and it is an unlikely place in which to put such a thing. The other chamber is of even larger size and of irregular shape, and there are five smaller cells.

The remains are by no means necessarily pre-historic. Bee-hive huts were used in primitive and out-of-the-way places down to comparatively modern times. There are some in the outer Hebrides which were inhabited in the 19th century, and may be still, for all I know to the contrary, and only the year before last I had some excellent Swiss beer in a twentieth century bee-hive hut at the Sassal Masone Alp near the Bernina Pass in the Engadine. This last was constructed on exactly the same principles as are the Cornish ones, and was quite new.

It is only a conjecture, for nothing, except possibly the stone with the circular cavity, has been found to confirm it, but I am inclined to think that we have here a Celtic Christian religious house, that one of the large chambers is the chapel, with its holy water stoup still *in situ* at the door, that the other may be the "community room," as it would now be called, or the refectory, or possibly both in one, and that the smaller chambers are the cells of the religious.

It may be objected that holy water was not used by the Celtic Church as it was and is in the Roman Rite. On this point there is not much definite information, but on the whole I think it was used in very much the same way. The use of holy water may, of course, be connected with the "aqua lustralis" of the Roman pagan temples, though I think it is much more likely to have been suggested by the laver of brass between the tabernacle of the congregation and the altar in Exodus xxx, 18-21, and it certainly is found in other rites than the Roman. Moreover, I think that this building may well have been used long after Saxon influence had come into Cornish Christianity. But it is not on this alone that I found my theory. The strongest argument, besides the resemblance to undoubted Irish religious houses, is in the name.

Mr. Borlase mentions that the remains are locally known as "the Chapels," and the name of the place is "Chysauster" or "Chysoister."

Dr. Bannister gives three suggestions for the meaning of this name. The first, given on the authority of Colonel Cocks of Treverbyn Vean, in St. Neots, is "heap- (*sawch*, Welsh) shaped (i.e. bee-hive) houses." "Sawch" in Welsh certainly does mean a heap, but to call a thing "heap-shaped" is rather like talking about its being "as big as a lump of chalk." Heaps are of all manner of shapes, according to what they are made of. It is ingenious, but not convincing. The next is "the dwelling on the south," and is quoted from Blight's "Week at the Land's End." There seems no reason for this meaning. South of what? The third is quoted from the older Borlase, but I do not know from what book. It is "house of lodging (*ostia*)." The objection to this is that one has to account for an intruded *s*. It should be "chy-ostia," or "chy 'n ostia," and that would mean an inn or lodging house, which there seems no reason to think that this was. But Borlase in his vocabulary gives, as a modern Cornish

word, "soster," with the meaning of "sister," and this, with the probable sound of a long *o* in Cornish, would come out as "sauster." Here we have it at once. "Chy Sauster," the House of the Sister. Of course it is an English loan-word, but there are plenty of those in Cornish, which were adopted into the language, and became to all intents and purposes Cornish words. It is not very likely that a foreign word would supersede the native word for a near relationship like that of sister in its ordinary meaning. We have an analogous case in English, where the French word "*frère*," brother, has been adopted for a particular sort of brother, one of a religious order, in the form "friar." You do not find a man calling his natural brother his "friar," though of course I am aware of the rather vulgar slang by which young people who think they know a little Latin speak of "the pater" and "the mater," and one certainly does find, also rather slangily, "*sira*" and "*dama*" used in late Cornish instead of "*tas*" and "*mam*" in the same meaning, just as "*sire*" and "*dam*" are used in English with reference to horses. But it is more likely that, like the French "*frère*," when it got into English, "soster" might be used in Cornish to signify a particular sort of "sister." Some Cornish plurals are formed, as in some other languages, by what the Germans call "umlaut," or the modification of the vowel of the singular, just as in English "man" becomes "men," and "mouse" becomes "mice." Possibly the alternative form "Chysoister," which seems to be locally the correct one, embodies a plural, and means "the House of the Sisters," that is to say, of the nuns. There certainly were nuns in the Celtic Church, and if my conjecture is right, there were nuns here after the Saxons had sufficiently influenced the country for a Saxon word to be introduced. If you look across the valley below us you will see a hamlet the name of which is "Bosulval." There is no question that this means "the Dwelling of Gulval" and we are in the parish of St. Gulval now. St.

Wulvola or Gulval was one of three sisters, all of them accounted saints, and of whom one was Sativola, Sikofolla, or Sidwell, after whom is named a church in what was once the Celtic part of Exeter. She and St. Gulval are joint patronesses of Laneast; the name of which suggests a foundation by St. Just. The other sister was Jutwara or Jutwell, whose relics were translated to Sherborne Abbey, and after whom the holy well called "Judwells" in Lanteglos by Camelford, not far from Laneast, is probably named. Their brother was St. Paul Aurelien, who became Bishop of Léon in Brittany. According to his Life, their father was Perf or Porphius, and they were born at a place which the Breton Life calls Pen-ejen, (enn eur c'harter a Enes-Vreiz hanvet Penejen," in a district of the Isle of Britain called Pen-ejen) which has been identified with Cowbridge in Glamorgan. The Breton word means "the Head of the Oxen." (Penychen in Welsh, Penujon in Cornish). The date of St. Paul's birth is given as 490. He was educated under St. Illtyd and was for a time chaplain to King Mark, and before he left him to go to Brittany he called at a convent somewhere in Cornwall, where he found that the superior was his sister, Sikafolla, as the Breton Life calls her, which is evidently meant for St. Sidwell. He is the patron saint of Paul, by Penzance, and, according to some accounts, of Ludgvan also. Family settlements of saints are very common, and perhaps St. Gulval settled at Bosulval to be near her brother's two settlements.

I am disposed to conjecture, in conclusion, that we have here the site of a convent of nuns, perhaps founded by St. Gulval herself, and called perhaps the "House of the Sister," meaning the sister of St. Paul, but more probably "of the Sisters," that is to say, the nuns. The word "soster" must have come into Cornish very early, for it is evidently taken from the Anglo-Saxon "swuster," not from the more modern form "sister."

I admit that this is all conjecture, but, though I do not think it is very likely, further excavations may produce something to confirm it. At any rate, it is the best explanation of the name that seems possible, and it is another of the many instances of history in Cornish place-names.



Thomas Hodgkin, Historian.

ONLY a year ago, a great, good and learned man, who was intimately connected with the Royal Cornwall Polytechnic Society, was taken from us. The Society has numbered among its members from time to time men of distinction in various subjects, and among its eighteen Presidents there have been several whose names have been widely known, not only in Cornwall, but throughout the Empire. The name of Thomas Hodgkin, the Historian, is as widely known and as highly honoured as any of them. To the Society he was more than a historian of European reputation, for unlike many of the distinguished men who have belonged to it, he was personally well known to the members, and his remarkable personality will not easily be forgotten.

Thomas Hodgkin, son of John Hodgkin, an eminent barrister, and a noted member of the Society of Friends, was born at Tottenham, in Middlesex, on the 29th of July, 1831. His family had been Quakers since the beginning of that Society, and, as is the case with nearly all old Quaker families, except the ancient Scottish house of the Barclays of Ury, begin their pedigree with the ancestor who first joined George Fox's institution. There is something rather characteristic of the uncompromising thoroughness of Quakerism in this, for undoubtedly there were many among George Fox's followers who were of gentle birth, and, had they not preferred, so to speak, to cover up their tracks and make an entirely fresh start with their conversion, might have laid claim to good armigerous descent.

His mother was the daughter of Luke Howard, a Fellow of the Royal Society, who was an eminent meteorologist, and from 1803

to 1842 was a recognised authority on a science which may be said to have been almost originated by him. There was something hereditarily appropriate that the last Presidential Address delivered by Dr. Hodgkin to the Society was on "The Weather."

Thomas Hodgkin was educated at Grove House, Tottenham, a Quaker school of high repute, and later at University College, London, then a comparatively new institution. He matriculated at London University with classical honours in 1848, and took his degree of B.A., again with classical honours, in 1851. He does not appear to have proceeded to the degree of M.A. In 1864 he was elected a Fellow of University College. Later in life, after he became a distinguished historian, the University of Oxford in 1886 conferred on him the degree of Doctor of Civil Law, and those of Dublin and Durham also gave him degrees of Doctor of Letters.

It was originally intended that he should follow in his father's footsteps and go to the Bar, but his health appears to have interfered with that project, and he adopted the profession of a banker instead. After studying the business in Yorkshire and Cumberland, he joined with relations in founding the banking firm of Hodgkin, Barnett, Pease and Spence, at Newcastle on Tyne. That he learnt the business effectively is evident from the fact that the bank was a very successful one, and is now, like many others throughout the country, amalgamated with Lloyd's Bank. But though no doubt he did whatever it is that bankers have to do "with his might," it was not his real interest in life. It was in the early seventies that he began to turn his attention seriously to historical studies, which had always had an absorbing interest for him. It is not very easy to see the connection between banking and history-writing, but the careers of Hodgkin, Grote, and that very early historian, the late Lord Avebury, seem to show that the two occupations are not mutually destructive. It certainly seems possible to be a good banker and a good historian at the same time.

The first of Hodgkin's historical works appeared in 1875, and was in period and style a foreshadowing of what he was afterwards to do. This was a not very large book entitled "Claudian, the Last of the Roman Poets. Two lectures delivered before the Literary and Philosophical Society of Newcastle." These lectures consist of analyses of the poems of Claudian as they describe the history of his period, and they incidentally touch on the attitude of the poet with regard to religion. The history is that of the reigns of Theodosius and Honorius, the period of the Gothic invasion, the rises and falls of Rufinus, Eutropius and Stilicho, a critical period indeed. This was the beginning of his study of the break-up of the Roman Empire, and the development of modern nationalities on the ruins of it, which later became his life's work. The analysis is worked out in a masterly fashion as regards the history, but the discussion on the religion of the poet is perhaps rather less convincing. It is quite a tenable opinion, contrary to Dr. Hodgkin's view, that the Paganism which pervades the poems is only literary "common form," like that which is found so often in the works of Claudian's contemporary Ausonius, who was undoubtedly a Christian. It may be that the epigram to Jacobus the Master of the Horse is the only genuine one of his poems which has any Christianity in it, and that the "Carmen Paschale," the "Laus Christi," the "Miracula Christi" and the two Greek pieces, *εἰς τὸν Σωτῆρα* and *εἰς τὸν Δεσπότην Χριστόν* are spurious. The Jacobus epigram, however, shows a rather varied knowledge of the Bible, for it mentions Paul, Peter, Thomas, Bartholomew, Judith, Susanna and Thecla, and alludes to the drowning of Pharaoh's host. Thecla, of course, is not a Bible character now, but the apocryphal "Acts of Paul and Thecla" narrowly escaped being included in the Canon of the New Testament, and Claudian died only about ten years after the Council of Carthage had finally settled the canonical books. The Bible characters are perhaps

treated with a little harmless levity, but there is nothing in that to show that he was not a Christian. If the five concluding epigrams that are commonly printed as his are genuine, there can be no doubt, and the constant pagan allusions in the larger poems and the wholly pagan Proserpine poem would probably show that the poet was one of those who were not uncommon in that transition period, a Christian with a literary admiration for pagan culture and no objection to pagan literary conventions. These were found also at the Renaissance period in larger quantities, and their influence in the sixteenth and seventeenth centuries occasionally invaded even the hymns of the Breviary itself.

It was five years later that Hodgkin began to publish his great work which he called "Italy and her Invaders." It was a bold thing to try and cover again the ground that had been covered by Gibbon, for of course a book with such a title must needs compete with "The Decline and Fall of the Roman Empire." But though they treat of the same period and are largely drawn from the same sources, the two books are so different that one does not compare the one with the other at all. It seems as if the influence of Gibbon on Hodgkin was absolutely nil. "Italy and her Invaders" might have been written, and written just as well too, if the author had never even heard of "The Decline and Fall." Of course, as a matter of fact, he probably knew the earlier book very well, but he went entirely to original sources, and owed nothing to his predecessor, except perhaps some of his references. In the matter of style the two books differ *toto caelo*. In the one there is all the ornamental phraseology, the elegant diction, the carefully turned sentences of the essentially elegant eighteenth century. One sees, as one reads, the writer in his fine coat and lace ruffles, smiling in satisfaction at some well turned expression. And there is the exasperating habit too of not quite telling any story right through, tantalising the reader and setting

him searching among the Byzantine historians to find out what it was that Procopius or Zosimus or whoever it may be really did say. There were no lace ruffles on Hodgkin's Quaker coat. His style is most excellent, but it is homely, practical, simple and intelligible, and a plain story is told in a plain way. There are marginalia and dates all through, so that one always knows where one is, and there are pictures, maps, engravings of coins and things, and good indexes. Yet there is nothing in the book of the dull, matter of fact stuff with which the Mouse sought to dry Alice and her animal companions, which was a quotation, he it understood, from a real history much in use half a century ago. Nor is it a case of "not seeing the wood for the trees." Indeed it is the wood rather than the trees that the author wants us to see, and his object was not so much to make a book of reference, as to bring into clear relief the ideas, ethical, social, political and religious, which pervade the period of which he wrote, and their bearings on the world's history. He wrote a philosophy of history rather than a history of Italy and her Invaders, and yet of course the book is also incidentally full of facts, if only the facts that were wanted for his purpose. This is not to say that he omitted essentials, only that he had a marvellous power of choice as to what was essential and what was not. The book is an essay on the period, rather than a history of it, but an essay that no one could have written who had not the history by heart.

The history begins with the Theodosian period, which is preliminary to the Visigothic invasion under Alaric. The story of the Goths from the earliest that is known of them is well told, and so is the story of their invasion of Italy. From the Visigoths we are taken on to the Huns, with a most interesting discussion of their origin from Chinese as well as European sources, and their fortunes in Europe until their final defeat at Chalons in 451. Then follow successively the Vandals, the Ostrogoths, the Imperial Restoration by Belisarius and the end of the Goths.

Then comes the Invasion of the Lombards, and the last volume ends with the establishment of the Holy Roman Empire of Charles the Great, after the final conquest of the Lombards by the Franks. The central point of everything is Italy, but we are taken about to Gaul, Spain, the Eastern Empire, Africa and even to Britain, and the history is really that of the Roman Empire, both Eastern and Western, from the late fourth century to the beginning of the ninth. Certain great personalities stand out conspicuously in the course of the book, as they did in life. Theodosius the Great, Stilicho, Attila, Genserich, Justinian, Belisarius, Odoacer, St. Gregory, St. Benedict, Theodoric and Charles the Great are the most noticeable of these, and the social history

ERRATUM.

p. 87, l. 15, for *Apollonaris* read *Apollinaris*.

we have not too many of them. In one subject he is perhaps less successful than in most. A very large proportion of the history of the period was mixed up with the religious controversies of Arians, Monophysites, Nestorians, and the rest, against Catholics. The matter in dispute certainly loomed very large at the time, and the mere fact that the Goths and Vandals were Arians, while the Franks, when at last they became Christians, happened to adopt the Catholic form of Christianity, had an effect upon the history of Europe which cannot be overestimated. Dr. Hodgkin of course knew all that perfectly well, or he would not have known that period as well as he did; but though he can appreciate and do justice to the characters of great churchmen, such as St. Gregory the Great, St. Benedict, and St. Arnulf of

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It is not quite fair to say that there is no fine writing in the book. There are many magnificent passages, but they are written not because they are fine, but because the author could not help it. When his subject carries him away, as it often does, he writes accordingly, and the fine passages are the finer because we have not too many of them. In one subject he is perhaps less successful than in most. A very large proportion of the history of the period was mixed up with the religious controversies of Arians, Monophysites, Nestorians, and the rest, against Catholics. The matter in dispute certainly loomed very large at the time, and the mere fact that the Goths and Vandals were Arians, while the Franks, when at last they became Christians, happened to adopt the Catholic form of Christianity, had an effect upon the history of Europe which cannot be overestimated. Dr. Hodgkin of course knew all that perfectly well, or he would not have known that period as well as he did; but though he can appreciate and do justice to the characters of great churchmen, such as St. Gregory the Great, St. Benedict, and St. Arnulf of

Metz, the whole subject of the details of the theological disputes, which, whether rightly or wrongly does not matter, were of such vital importance to the actors in them, seems to be so distasteful to him that he passes it by with comparatively little notice. It is on the same principle that he hardly alludes in his history, and not at all in his "Life of Charles the Great," to the one work of that Emperor which has endured to this day, the fusion of the Gallican and old Roman Rites into the Roman Rite of the present time. Everything else that Charlemagne instituted has departed into the limbo of obsolete things, and only the historical memory remains, while the eclectic service-books of his private chapel, which perhaps he and Alcuin edited between them, are used, of course brought up to date, in every church of the Latin Rite to this day. Yet Hodgkin hardly thinks this worth mentioning. Gibbon sneered at the Arian controversy as a "difference of a single diphthong," which it was, no doubt; but the diphthong made a good deal of difference to the meaning, as Gibbon knew perfectly well. Hodgkin does not sneer. He never has anything but respect for other people's religions, however wrong-headed or foolish they may seem to him, but he cannot really appreciate the causes of these furious contests, and so, perhaps wisely, he makes very inadequate attempts at statements of the doctrines in dispute, and he leaves them alone as much as he can, though it makes rather a gap occasionally. As for the rites, they are evidently nothing to him, wherein, indeed, he is not singular. It is the one deficiency that can be found in an otherwise remarkably complete and wholly fascinating history.

"Italy and her Invaders" was begun to be published in 1880, and the first edition in four volumes, taking the history down to the end of the Ostrogothic Kingdom and Imperial Restoration, was completed in 1885. A second edition, with a little revision of the first part, and continuing the history down to Charles the Great, was published in eight volumes in 1892 to 1899. In 1899

there was published in a separate form, a treatise on "The Walls, Gates and Aqueducts of Rome," taken from vol. iv. of "Italy and her Invaders." This, like the wonderful description of Ravenna in vol. i., shows what a sound and observant antiquary the author must have been.

In 1886 he published "The Letters of Cassiodorus, being a condensed translation of the *Variae Epistolae* of Magnus Aurelius Cassiodorus Senator, with an Introduction." The introduction is most interesting. Cassiodorus, born 480, died 555, "a Roman noble by ancestry, a rhetorician-philosopher by his training, became what we should call Prime Minister to the Ostrogothic King Theodoric: he toiled with his master at the construction of the new state, which was to unite the vigour of Germany and the culture of Rome: for a generation he saw this edifice stand, and when it fell beneath the blows of Belisarius he retired, perhaps well-nigh broken hearted, from the political arena." The editor discusses the pedigree, name, birthplace, appointments, and character of Cassiodorus, his writings, including the "De Rebus Gestis Gothorum," only known to us through the abridgment of Jornandes, his services to Theodoric, to the Regent Amalsuentha, the mother of the boy king Athalaric, to Athalaric himself, and to his successors Theodahad and Witigis. There is an interesting account also of the monastery founded by him for both hermits and coenobites, under the Rule of Cassian (not under that of St. Benedict, which was then only just instituted), at his native Scylaceum, now Squillace, in Calabria. His religious literary work is described, and there is a very valuable chapter on the gradations of rank in the later Empire, and especially on the office of "Praefectus Praetorio," which was held by Cassiodorus from 533 to his retirement in 539.

This book was followed in 1889 by "The Dynasty of Theodosius." In this work there is one most interesting preliminary chapter on the Roman Empire in general, in which may be

especially commended a comparison of the motives of Diocletian and Constantine, the one as a persecutor and the other as a protector of Christianity, and another on the Roman and the Teuton, compared and contrasted. After a chapter on the coming of the Huns, and its effect on the movements of the Visigoths into the Empire, the author tells the story of the Empire from Theodosius the Great (379 to 395) to Valentinian III (425 to 455), a period of the greatest importance, including as it does the invasion of Alaric, the coming and retreat of Attila and his Huns, the invasion of Genseric and his Vandals, and the division of the Empire into East and West. Of course a great deal of what is told here is also told, in greater or less detail according to circumstances, in Hodgkin's great work, but the method of this book is more concise, and it is in this case history, rather than the philosophy of history, while "Italy and her Invaders" takes the more general view.

In 1891 appeared a masterly biography of Theodoric, the great king of the Ostrogoths, who is so intimately associated with what in even its present condition is probably the most interesting town in the world, Ravenna. Few have ever appreciated the fascination of that wonderful place more fully than Hodgkin, for few have ever gone there with such fulness of knowledge of its history, and of the bearings of that history on the world. To the most ignorant it must mean a good deal to step out of the modern railway station direct into the sixth century, and stay there for the term of one's visit, for later matters, except perhaps the associations with two great poets, do not obtrude themselves on one's notice; but to Hodgkin, who knew the sixth century as well as if he had been born in it, or even better, it is no wonder that it was the most delightful place in the world. Thus it was that also there was fascination for him in the great Ostrogoth, whose empty tomb is one of the sights of the town, and whose ecclesiastical buildings, turned away from the heretical worship

of the long extinct sect for which he founded them, are very much in evidence. Moreover, Theodoric was one of the most important figures in that transition period, when Roman civilisation was breaking up, and the good part of it was being assimilated by the new nations that were arising on its ruins, and this, as we know, was Hodgkin's real interest in his special period. It is hardly necessary to say that he made a most delightful and readable biography of this great king. Again, of course, there is much that may be found also in "Italy and her Invaders," though differently told.

Another great biography is his "Charles the Great," published in 1897. This is a short book, one of the "Foreign Statesmen Series." The subject is one which in Hodgkin's hands could not fail to be interesting, and it is not too much to say that in every point except one, which has been already mentioned, he has done ample justice to it. That Charlemagne as statesman, as patron of literature and art, as organiser and legislator, should appeal to him more than did Charlemagne the War-lord, is not to be wondered at, but he does not fail to see that even that aspect of his hero had its points also.

The Roman Empire from the Peace of the Church to the coronation of Charles the Great, was Hodgkin's special period, and in it he was at his best. But he shewed what he could do in other history in the first volume of "The Political History of England," published by Longmans in 1906. This volume takes in the period from the beginning to the Norman Conquest. Part of this book deals with the very shadowy time of the coming of the Saxons. It is worthy of note that not many years later there appeared another important English History, of which the first volume, written by the Editor, Mr. C. W. C. Oman, deals at very similar length with the same period. It would not be uninteresting to compare the attitudes of these two eminent writers towards the authorities on the subject, and to see how much more Hodgkin

is inclined to trust to Celtic authorities than most people do. He seems to accept Arthur, for example, as a historical person, and to treat a good many of the statements of Nennius as worthy of consideration. For this obscure period he takes the Life of St. Germanus, the Anglo-Saxon Chronicle, Bede's Ecclesiastical History, Gildas and Nennius as his guides, and compares what they have to say in a masterly manner. In his remarks on the migrations of the Britons to Armorica, he has some foreshadowing of that excellent address which he gave to the Royal Cornwall Polytechnic Society in the first year of his Presidency. He does not, it is true, accept the legend of the Emperor Maximus and his lieutenant, Conan Meriadoc, as much as he did later, but he shows from the Anglo-Saxon Chronicle that there was an early migration in 418, and from Sidonius that there were Britons established on the Loire as early as 469, and he is inclined to put the migration fairly early. The whole volume is well worth careful reading, as a specimen of the true historical method applied to a period and country which were not included in his normal study.

There is no question that Hodgkin had devoted much time to local history in his own district, where local history must need consist chiefly of archæology. He probably knew more about the Roman Wall than anyone else, but he did not write much about it. In 1907, however, he published a very interesting treatise on "The Wardens of the Northern Marches. Creighton Memorial Lecture," delivered at the University of London, 4th October, 1907. This little book, though it is only a pamphlet of 32 pp., gives in a concise form the history of three centuries of Border affairs, from 1333 to the Union of the Crowns of England and Scotland. It tells of the origin of the Wardenship, the character of the country on either side of the Border, the names and families of the Wardens, and of their duties, with illustrations of the anarchical state of the Border down to the time of

Elizabeth. The topographical knowledge displayed is immense, the style is interesting and readable. In places it is as if he had done the Border ballads of Scott and Surtees into remarkably flowing prose.

There was another side to Hodgkin as a writer. He was always a historian first, but he was also a convinced member of the Society of Friends. This fact coloured his purely historical writings surprisingly little, for he was always more concerned with getting at the truth as to facts than with running any theological side. Quakerism was his "tradition." He was brought up in it, and must have accepted it positively at a very early age, and apparently he never deviated from its teachings down to the end of his long life. Thus it was that at times he put his great powers at the service of his religion, and published several books that are of less general interest than his historical works, but will some day have an interest of their own to all students of religion. They show very plainly how a creed, which, rightly or wrongly, seems to many of us singularly bald and meagre in its simplicity, can at times be transfigured by the mind of an unusually learned and thoughtful man, whose powers of expression were of so high an order. The most important of his books addressed to his fellow members of the Society of Friends was one of his latest publications, "The Trial of our Faith and other papers," published in 1911. This consists of lectures delivered during the last forty years, and a few articles contributed to the "Friends' Quarterly Examiner." There are twelve articles in all. These are :

1. "The Trial of our Faith," which seems to be a discussion of the rival claims to consideration of a definite dogmatic theology on the one side, and, on the other, what might appear to some people to be a rather nebulous faith in God and Christ without predicating anything about them. It is needless to say that the author does not think much of dogmatic theology. One

sentence shows the bent of his mind on this matter. "Councils of wrangling bishops, hair-splitting Greeks, fanatic Egyptian monks have sought to define that which the Saviour himself left undefined of His relation to the Eternal Father, and to my mind all that they have done is but "darkening counsel by words without knowledge." It is not by the arguments of an Ecclesiastical Debating Society nor by Bill and Answer in a great theological Chancery suit that men are meant to arrive at the Truth. "The secret of the Lord is with them that fear Him, and He will show them His covenant." Whatever one may think of his conclusions, one cannot fail to see that this lecture is a very remarkable and lucid exposition of one view of the answer to Pontius Pilate's question. The only deficiency in it is that the writer does not seem to be able to see that there can possibly be any other tenable view, or that even his "wrangling bishops," etc. might conceivably have been also among "them that fear Him."

2. "The Central Mystery of Christianity." With the exception of a few hits at Papalism and Catholic Christianity generally, of which the author seems to know and understand singularly little for so great a historian, this is a very fair, if rather nebulous dissertation on the quite true proposition that the central mystery of Christianity is Christ.

3. "Predestination." There is not much of interest in this lecture, except that it contains some fine pieces of eloquent English. The general impression seems to be that there is a great deal to be said on both sides. Discussion of this doctrine is really nowadays rather a "back number."

4. "The Epistle to the Galatians." This is by way of being a new translation into modern language, with a few preliminary remarks. It is perhaps rather a paraphrase than a translation. Of course it is well done, but it is not of much general interest.

5. "Early Christian Worship." As a contribution to liturgical studies, which was not a subject on which Hodgkin was well informed, this is not of much value. "Early Christian" in this case means nothing later than the Apostolic Age, and the whole evidence is taken from the New Testament, though the evidence afforded by Revelation iv., v. is not included, as the author was not sufficiently well versed in liturgiology to see how closely the vision described in those chapters resembles the earliest extant form of the Eucharist. The "Decline and Fall of Christianity," as he calls it, came, he thinks, largely through Gnosticism in the second century, after which formalism set in. Apparently the Christians of the first age were very like Quakers.

6. "The Feasts and Fasts of the Jews." As a study of Bible evidence on the subject, this is of some interest, but with the exception of the Birchoth Chanukah, and a few words about modern Jewish practices at Purim, there is nothing but what may be found in the Bible. There is one interesting detail given, of which the author does not see the bearings. He points out that Josephus calls the Feast of Chanukah (which the New Testament, St. John x, 22, calls τὰ ἐγκαίμα, the Dedication), by the name of "Phota," the Lights. But he is evidently not aware that this is the popular name in the Eastern Church for the Epiphany, which occurs at almost exactly the same time of year, and commemorates the Baptism of Christ, not, as in the West, the visit of the Magi. This has bearings on the continuity of the Jewish and Christian Churches in the matter of festivals, which would have interested Hodgkin had he known of it.

7. "The Epistles of Ignatius." This is the best article in the book. It is a good discussion of a very interesting subject. Of course the author owes a great deal to Lightfoot's "Apostolic Fathers," but since the publication of that work, everyone who has written on any of the subjects in it must necessarily owe a good deal to it. Hodgkin accepts Lightfoot's conclusions in

taking what is called the "middle form" of the Epistles to be the right one, and frankly allows that the passages in favour of Episcopacy are genuine, though he would much prefer that they should not be. This is a good specimen of the honesty of the great historian, who prefers truth to a controversial score.

8. "Paganism and Christianity." This is in the form of a review of Dr. Rendel Harris's edition of "The Apology of Aristides." It is really a dissertation on the Paganism which existed in the early days of Christianity, and to some extent on the influence of that Paganism on the developments of Christianity, well and temperately stated.

9. "On the Prospects of English Protestantism." This is an interesting and informing article on the Quaker view of Catholicism. There is no need to say that it differs considerably from the Catholic view of it, even in the statements of Catholic doctrine. There is the not uncommon mistake of interpreting technical theological language in accordance with the changed modern meanings of the words used, and of taking isolated expressions without reference to explanatory context. Yet even in its most polemical language, the article treats the opinions of opponents with gentlemanlike respect, and gives to others that credit for good intentions which the author would expect to have given to his own views.

10 and 11 are short biographical sketches of George Fox, the founder of the Society of Friends, and of James Parnel, a seventeenth century Quaker of eminence, who suffered martyrdom for his faith under the hypocritical intolerance of the Commonwealth. The author is of course quite right in saying that "all sects, except the Friends, were more or less stained by the crime of persecution; it was only a few solitary thinkers such as Jeremy Taylor and Roger Williams who desecrated the coming dawn, and pleaded for the toleration which is now, at least in theory, accepted by all Englishmen." But it would have been

more in accordance with historical truth not to have omitted the name of the one man, who, believing in toleration and having the power to put his theory into practice, did so, and lost his crown by the deed, James II.

12. "Antiochus Epiphanes and the Maccabees." This is told out of the Books of Maccabees, with a few illustrations from other sources. These books, of course, do not occur in the Bible as understood by the Society of Friends, or indeed in that of any of the English Reformed Churches, except the Church of England. The story was therefore much less well known to the hearers of the lecture than it would have been to those in whose Bible those which are classed as the "Apocryphal Books" are included. Even to those who have read the original books, Dr. Hodgkin's telling of the story will be of great interest.

This collection is the most important of his writings which were avowedly intended for his co-religionists. It is not in the least in a carping spirit that one points out that the book is coloured throughout by "Quaker prejudice." It could not be otherwise, and the intense interest in the lectures is due largely to the fact that this is so. The opinions of a mere stupid sectary are of no importance, but that is just what Hodgkin was not. Even those whose conception of the externals of religion is the most diametrically opposed to his will find an astonishing amount to agree with in what he says, and will appreciate the workings of so cultivated and so kindly a mind, even when they disagree entirely with his conclusions.

Dr. Hodgkin published also a few short pamphlets on Quaker matters. Of these one of the best is the Swarthmoor Lecture for 1911, entitled "Human Progress and the Inward Light." These lectures were established by the Woodbrook Extension Committee in 1907. "The name "Swarthmoor" was chosen in memory of the home of Margaret Fox." Their object is to interpret further to members of the Society of Friends their

message and mission, and to bring before the public the spirit, aims and fundamental principles of the Friends. This lecture is a very remarkable statement of the ideas of the Society, and whether one agrees with it or not in detail, one cannot fail to appreciate its high tone.

An article on "Old Testament Criticism," reprinted from the Friends Quarterly Examiner in 1890, does not add much to the controversy, except an exceedingly witty skit on what might be said of the New Testament if no manuscript earlier than the sixteenth and seventeenth centuries existed, and "if the denudation of Christian literature from Ignatius to Hooker had been anything like as complete as the denudation of Hebrew literature from Moses to Malachi." Another contribution to Bible criticism is a short paper read at the Summer School at Scarborough in 1897, on "The Inspiration of the Bible." The views expressed in this are moderate and rather broad, and the conclusion is summed up in the words, "After all . . . it is not Moses, nor even Isaiah, but Christ that you have to preach," which leaves little to be desired.

Apparently Hodgkin did not take much part in politics. An address, delivered at Falmouth in April, 1890, on Mr. Balfour's Land Purchase Bill was printed by the Liberal Unionist Association. This of course, is now very much a "back number," but it is very well expressed. Nominally he is rather anti-party, though, being a Liberal Unionist, he follows his leader and approves where he approves. But one cannot imagine Hodgkin as a bigoted party man on any side, and in this case his leader's ideas probably commend themselves to him, or he would not have followed them. He made one small contribution to the settlement of the religious education difficulty, in a pamphlet entitled "National Education, a retrospect and a prospect." In this he makes an ingenious suggestion, which does not seem to have attracted any attention. He suggests a division of the

education rate into "secular" and "religious." For instance, if the rate is sixpence, let five pence halfpenny be for "secular" and one halfpenny for "religious." Let the secular rate be compulsory, and the religious voluntary. If no one pays the latter, let there be no religious education in the school, and if only some of the rate-payers pay the halfpenny rate, they are to decide what form of religion is to be taught. The author himself approves of undenominational Bible teaching, but would like to call it "fundamental." The suggestion has not yet been adopted anywhere, and probably will not be until someone else happens to want peace in educational matters, which seems improbable. As it does not provide for minorities, would it make peace?

In a series called "Leaders of Religion," edited by Canon Beeching, Hodgkin published in 1896 a "Life of George Fox." This was written with his accustomed thoroughness, and though it is not a large book, containing only 284 pp., it probably contains all that is necessary to the understanding of the career of the founder of Quakerism. This biography went to new editions in 1897 and 1906. Much about the same time he wrote a small pamphlet on Quakerism for a series dealing with various religions, entitled 'Our Churches and why we belong to them. Contributed by prominent members of each Church.' It is probably the best short account of the views of the Society of Friends in existence.

These are the works of this learned man, who, we can always remember with pride, was once President of the Royal Cornwall Polytechnic Society. As Thomas Hodgkin was to some extent to be accounted as a writer on religious subjects, it has been necessary to introduce some allusions to matters which are outside the scope of the Polytechnic Society. It would have been impossible to deal with his writings without doing so. Had one dealt with his purely historical works only, it would have been easy enough, for he never shows in them any indica-

tions of his personal creed. But one could not do justice to his literary career if one omitted a criticism of his other writings. Hodgkin was beyond doubt a great writer, a great historian, but he was also, as the Polytechnic Society has good reason to know, not so much a great talker, as a great conversationalist. There is a distinction, and he observed it. His talk was most interesting and informing, his method of expression most felicitous, and he never made the mistake of keeping the whole of the talk on his own side. In this, as in a good deal of his conversational manner, he resembled the late Mr. Gladstone, who in the same way was quite as good a listener as talker. There was also a certain charm of manner which was common to both men. The present writer had only a short personal acquaintance with Dr. Hodgkin, having met him for the first time in the summer of 1910, but he had previously read all his historical works, and can testify that the personality of the man himself was even more fascinating than his books, which is saying not a little. And members of the Society who knew him better will probably agree with that estimate.

HENRY JENNER.



The Governors of St. Mawes Castle, 1557—1847.

By F. J. STEPHENS, F.G.S.

A Paper read at St. Mawes Castle, July 15th, 1913, at the Summer Excursion of the Royal Cornwall Polytechnic Society.

THE building of St. Mawes Castle started in 1542.

Previously to this, in 1537, John Arundel, of Trerice, grandfather of old "John for the King," the hero of Pendennis siege in 1647, after describing a fierce fight between the French and the Spaniards in Falmouth Haven, petitions Henry VIII on behalf of the gentry and traders of these parts "that blocke houses may be built to keep the invader out."

As a result of this and other appeals, Henry VIII built many castles, Dartmouth, Deal, etc., along the South Coast of England.

Lysons says St. Mawes Castle was built before Pendennis. In a contemporary print (1542), Pendennis is shown, but with no Castle, but on the St. Mawes side, a Castle is shown, with "half made" inscribed around it.

One of the later Governors said it cost £5000, or thereabouts to build. (Privy Council Reports, 1604). Thomas Treffry of Fowey, was the architect and builder appointed by the Privy Council for the purpose. This Thomas Treffry married the daughter of the Sir John Killigrew of the period. His name frequently appears in contemporary history as a man of importance, and he was frequently selected by the Country's rulers for

various delicate offices, such as commissions to try his friends and neighbours for piracy and other offences.

It appears to have been 14 years before the castle was finally completed, and during a portion of this time, Treffry acted as Captain of the Castle.

In 1547 Sir Philip Hoby, Master of Ordnance, is required to deliver certain stores and ammunition to Thomas Treffry for the use of St. Mawes, so doubtless guns were mounted before the Castle was completed. Even then the ordnance supplied seems to have been either not ready, or inadequate, for in 1548, Rd. Stephyn of Feocke, a notorious pirate, is reported as having seized a ship of Lubeck, under the guns of St. Mawes, and as having plundered her in Helford Haven.

In 1548, Thomas Treffry received a sum of £20 for the maintenance of certain French prisoners, and a delivery of an Italian ship supposed to have French goods on board.

In 1552, (Edward VI,) the garrison of St. Mawes Castle under Treffry was much reduced.

The next year, 1553, Sir Hugh Trevanion and Sir John Arundell, staunch Catholics, were sent by the Privy Council to take over the Castle, make a survey, and hand the charge over to Thomas Arundell.

This does not seem to have resulted in the complete dismissal of Treffry, for in Mary's reign, we find that Treffry, as Captain of St. Mawes, was requested to look after the operations of one Burchart Cranys, a German, who under Royal license, was authorized to search for mines of copper, silver, and gold in Cornwall.

The inscriptions on the walls were composed by John Leland, the antiquary, at the request of Thomas Treffry, as is stated in that author's Itinerary. Four of them are very passable hexameters :—



HANNIBAL VIVIAN, OF TRELOWARREN,
2nd Governor of St. Mawes Castle, 1561-1595.
(From a Painting at Trelowarren).



Bell from St. Mawes Castle, now at Trelowarren,
inscribed "Haniball Vivian, 1600."

Imperio Henrici, naves, submittite vela.

To the might of Henry, ships, lower your sails.

Semper honos, Henrice, tuus laudesque manebunt.

Henry, thine honour and praise shall ever endure.

Edicardus fama referat factisque parentem.

May Edward imitate his father in fame and deeds.

Gaudeat, Edwardo duce nunc, Cornubia felix.

Let happy Cornwall rejoice that Edward is now the Duke.

The others are not in verse :—

Semper vivat aīa [anima] Regis Henrici Octavi, qui Anno XXXIV° sui regni hoc fieri fecit.

May the soul live for ever of King Henry the Eighth, who in the 34th year of his reign caused this to be built.

Honora Henricum Octavum Angliae, Franciae et Hiberniae Regem excellentissimum.

Do honour to Henry the Eighth, the most excellent King of England, France and Ireland.

The first actual Governor was Michael Vyvyan of Skyburriow, who died in 1560–1. He was the first of the long list of Trelo-warren Vyvyans who held this high office for several generations.

The Privy Council Reports do not give any particular reason for this appointment, but as Henry VIII was known to have made a tour of his newly built and building castles, it is possible that this was the result of a kingly promise.

It is a little obscure which Michael Vyvyan this was of two Michael Vyvyans of this period—one Michael Vyvyan of Trelo-warren, Sheriff in the time of Henry VII. (1507) lived from 1475 to 1520 and his second son Michael, who married Jane Hill of Heligan, lived at Skyburriowe in Mawgan in Meneage. The latter was no doubt the Governor of St. Mawes. Nothing particular happened in his Governorship. Hannibal Vyvyan, the second Governor, was son of John Vyvyan of Trelo-warren.

During his Governorship the Spanish Armada was defeated, but there are no contemporary accounts of any particular deeds arising out of that exciting period at either of the Castles or in the harbour. In 1582, soon after his appointment, Hannibal Vyvyan wrote to Sir George Carey (Master of Ordnance) in respect of certain guns and ammunition received for the castle, complaining that the guns were inferior and the powder worthless and that "if he could not have the ordnance and gear he required he could not dwell therein" (in the castle). Besides the Governorship, Hannibal Vyvyan was Member of Parliament, first for Plympton and afterwards for Helston. He was killed in a brawl in London, and carried from "Gibson's house in the Friars" to be buried at St. Dunstan's in the East (off Eastcheap) in 1609.

His son, Francis Vyvyan, of Treloarwarren, was appointed 3rd Governor in 1595 at the age of 20. Besides holding this office he was Member of Parliament for Fowey in 1604. In 1618 he was knighted by James I. at St. Theobald's.

In 1602 an inventory of the stores in St. Mawes Castle was made. There were then 100 soldiers, of whom 40 each were "pikemenne and musketeeres," and 20 were calivers or gunners.

There is an interesting note about this Governor in Carew's Survey, 1602.

"Upon the east side of the haven's entrance, St. Mawes Castle with his point blank ordnance comptrolleth any shipping that deserve a denial of admission or passage and is commanded by Mr. Vivian, a gentleman who through his worth deserveth, and with due care and judgment dischargeth the martial and civil government committed to his trust."

This passage would imply the control of the town of St. Mawes as well as the Castle.

At this time it should be remembered that there were no houses along the front of St. Mawes—no ugly jerry built villas,

or terraces as now ; but the quaint old town nestled for the most part on the western sides of the little creek and behind Bohella. In those days probably no houses intervened between the Castle and the old part of the town.

In 1623 a report on the strength of the castle was made by Sir Thomas Cecil and a sum of £700 recommended properly to fortify the place. It was also pointed out that the Castle was commanded by higher ground on the land side.

Carew's Survey however states that St. Mawes Castle was built rather as a check to pirates than as a defence against a formidable enemy.

A great deal of jealousy appeared to have existed between the two castles. The missiles of the ordnance of those days would not reach across the harbour and in earlier times stone balls made from granite appear to have been used. Many of these balls, dredged up from the harbour, have been collected at Nanshuttall farm-house, not far from the castle.

In 1630 great complaints were made to the Privy Council by the Killigrews and Arundells that Sir Francis Vivian, Governor of, and Hannibal Bonython, lieutenant-governor of St. Mawes Castle, coerced all shipping coming into the harbour, forcing them to anchor under the guns of St. Mawes and taking out their ladings of corn to the great detriment of Pendennis and the country on that side, who were thereby reduced to starvation. Probably this was during one of the too frequent periods of famine of those days, when foreign corn was brought into England. The parishes about St. Mawes, however, petitioned in favour of St. Mawes, and it was pleaded that St. Mawes being the older castle (by two years) had privileges.

A Commission of Lords of the Admiralty decided that all ships anchoring on the western side of the Black Rock were subject to the Governor of Pendennis and on the eastern side to the Governor of St. Mawes. A good deal of bitter feeling continued,

Bonython being charged with compelling ships to anchor on the St. Mawes side.

In 1632 Sir Francis Vyvyan and Bonython were charged before the Star Chamber on suspicion of mal-appropriation. Such charges were common in those times, Killigrews, Arundells, and others having at one time or other had similar charges brought against them. Political bias had no doubt a good deal to do with this trial. In the end the Governor was fined £2,000, and removed from his office.

Robert Le Grice became 4th Governor, but constant quarrels with Bonython, who remained Lieutenant Governor, led to his being replaced by Thomas Howard, Earl of Arundel and Surrey, as 5th Governor. During this period repairs to the extent of £500, were carried out.

In 1642 the Civil War broke out, and with it Arundel was removed from his Governorship, and Bonython, always in early days a hot Cavalier, was made 6th Governor. During his term of office as Lieutenant Governor, and afterwards as Governor, repeated charges were made against him of mal-appropriation, smuggling, and more important, of disaffection to the royal cause.

It is doubtful whether St. Mawes Castle saw much fighting during the Civil Wars.

One account says that the Castle made a stout defence till over topped by Fairfax; others that it was surrendered without a shot being fired to Fairfax. Fairfax himself, however, reported the capture of 13 guns, two of large size, and plenty of ammunition. There are no entries in the St. Just registers bearing on burials of soldiers on either side, which appears strange.

During the siege of Pendennis, Sir John Arundell appeared to have repeatedly invited Bonython and his men to throw in their lot with him, and abandon St. Mawes Castle, but his suggestions were not entertained. This gives colour to the suspicions as to Bonython's disaffection to the royal cause.



**SIR FRANCIS VYVYAN, OF TRELOWARREN,
3rd Governor of St. Mawes Castle, 1595—1632.**
(From a Painting at Trelowarren).



**SIR RICHARD VYVYAN, 1st BARONET,
OF TRELOWARREN,
8th Governor of St. Mawes Castle, 1660—1665.**
(From a Painting at Trelowarren).

The Parliament appointed Kekewich as 7th governor with one Rouse, who was also Governor of Pendennis, as the Lieutenant Governor.

Rouse appears to have risen from low estate to a considerable affluence, for the following lampoon was written about him by John Trefusis at this period.

“ In wealth Rouse abounds
“ He keepeth his hounds,
“ Full 14 couple and more ;
“ When he lived in a house
“ With an owl and a mouse,
“ Oh they say he was wondrous poor,
 So they say.”

Probably the reference to the owl and the mouse were political.

In 1660 at the Restoration, Sir Richard Vyvyan was at once appointed 8th Governor, and held the post till 1665, when he retired in favour of his son Sir Vyell Vyvyan of Trelowarren.

Sir Richard was Member of Parliament for Tregony and Penryn in 1640 and 1641 (Long Parliament).

He was knighted by Charles I, and created a baronet 12 Feb. 1644-1645.

One of his first acts as Governor of the Castle was to petition in 1660 that a few more soldiers might be supplied to maintain the watch, there being only one gunner and twelve soldiers who have to be on guard every other night.

In 1661, however, the garrison was still further reduced, and the end of its career as an efficient fighting unit seems to have been reached.

Pendennis by this time was a formidable defence and its artillery was undoubtedly capable of guarding the harbour without the aid of St. Mawes, which it had long been recognised was constructed far too low down.

Sir Vvell Vyvyan the 9th Governor died in 1696. He left no children, and although his nephew the 3rd Baronet, Sir Richard Vyvyan, succeeded to the Trelowarren estates, the more or less hereditary Governorship of St. Mawes Castle held till then by the Vyvyan family seems to have then lapsed. From this date the appointment seemed to have become purely complimentary. The Governorship however was kept up until 1847, when it was abolished.

Succeeding Governors to Sir Vyell Vyvyan were :—

Sir Joseph Tredenham with deputy Edward Boscawen.

The Tredenhams were ancestors of the Spry family who at this time secured the Place (St. Anthony) estate.

Viscount Falmouth, 1704–1734.

Major de Revoen, until 1740.

General Durene, 1765. This general appeared to have won distinction at the Battle of Fontenoy.

General Pigot, 1796.

Colonel Morrison, 1798.

Field Marshal Sir George Nugent and others.



Admiral Sir Richard Spry, 1746—1775.

BY F. J. STEPHENS, F.G.S.

*A Paper read at Place House, St. Anthony in Roseland,
July 15th, 1913, at the Summer Excursion of
the Royal Cornwall Polytechnic Society.*

ADMIRAL Sir Richard Spry was born at Place, St. Anthony-in-Roseland in 1715.

He entered the Navy at an early age, but little is known of the first ten or twelve years of his service therein. There are eight manuscript volumes at Place House, which through the kindness of Mr. J. S. Spry, I have been enabled to study and take extracts from.

These are mostly copies of letters to and from the Admiralty and various commanding officers, referring to cruises, the carrying out of Navy orders, etc., relating to the various ships commanded by Admiral Spry at different times, and are probably private copies made by his Secretary of the official transactions.

Seven of these volumes comprise Sir Richard Spry's various commands, but the latest volume relates to those of Thomas (Davey) Spry, who also was an admiral in the Navy, and who was Sir Richard's nephew and heir.

The first entry in these manuscripts (Sept. 12, 1744), is a copy of an official communication appointing Spry, then a Lieutenant, to the command of H.M. Sloop "Comet" of 18 guns.

The "Comet" was one of the West Indian Squadron at Antigua, under the command of Admiral Knowles. She was soon detached and ordered to proceed to Boston in company with Captain Gayton of the "Success."

The "Comet" appears to have been very badly fitted out, all rigging, spars, and hull being in a poor state, but nevertheless, Spry, although parting company with his senior officer in a gale, made a very signal success by fighting and capturing a new French privateer of 24 guns. This Frenchman had already taken five prizes, and although carrying many more men, and vastly superior in armament, surrendered after a six hours running fight to Lieutenant Spry.

In a graphic account of the action sent to Commodore Knowles, Spry wrote "at last a lucky shot went through his (the French captain's) speaking trumpet, and into his eye, after which we found a sensible difference in the working of the privateer, and after about an hour she struck."

The "Comet" arrived safely at Boston with the prize in November.

After some service off Cape Breton and the American coast, early in 1745, Spry had the misfortune to be captured in the "Comet" by a Spanish privateer of 30 guns, while convoying merchant ships to the Windward Islands. Spry appears to have been 43 men short in his Sloop's complement, while the Spaniard carried 356 men on board.

Taken into Havana and kept prisoner there for some time, he appears to have escaped eventually to Charlestown in South Carolina in June 1745, although the journal does not state how he managed it. He made good use of his detention, being able to forward important information to the Admiralty in England as to the defences of Havana, and the condition and movements of the Spanish fleet. In a flag of truce between the Governor of the Carolinas, and the Spanish Governor, asking for the

exchange of certain prisoners of war, the latter declined to release some Irishmen on the grounds that the Irish belonged as much to Spain as to England.

In 1746, after service under Admiral Warren in the West Indies, Spry became Commander of the "Chester" frigate, and convoyed merchant men to Boston, on which passage Capt. Rouse of the "Shirley" lost his ship in a violent gale. Spry announced in despatches this disaster, and also the dispersal of the French fleet in the same gale, and the total wreck of two of their large ships.

In December 1746, the "Chester" paid off at Spithead, and Spry, courtmartialled for losing the "Comet," was honourably acquitted and confirmed as Commander and Captain of the "Chester."

He applied about this time for leave, having been "three years out of England."

Shortly afterwards he met with a severe accident in endeavouring to land on Deal Beach in a gale of wind.

In 1747 the "Chester" with Spry in command of a small squadron was sent out hastily to reinforce Anson then blockading Brest, but was too late to participate in that great Admiral's victory over Jonquière off Finisterre. There is an interesting answer from Anson to Spry's letter of congratulation in which the former attributes the late arrival of the squadron "to Spry's recent illness, and owing to his officers keeping a bad look out."

The "Chester's" next service was the convoying of a fleet of 17 French prizes to Spithead and the Thames. One of these was unfortunately wrecked on the Goodwins and persistently plundered by Ramsgate boatmen, who "cut the ship's best stream cable."

Spry retaliated by "pressing" the Ramsgate men, but was ordered by the authorities to set them at liberty again. There is an interesting dispute between the port officers at Portsmouth

and Spry, an officer of the "Royal George" having taken 21 of Spry's best men out of the "Chester."

In 1748 the "Chester" and the "Ruby" under Commodore Spry were ordered to the East Indies to join Admiral Boscawen's blockading squadron. On the way he was to touch at Mauritius and obtain information as to the fortifications there.

Amongst other services in the Bay of Bengal the "Chester" took part in the attack on Pondicherry, her boats sounding in the harbour to prepare for the advance, and the great Dupleix was received on board as prisoner after his surrender. After long service, in which plague and other epidemics were combated, the "Chester" was sent home via the Cape of Good Hope and St. Helena, (her seamen coming into collision with the Dutchmen at Capetown,) and finally paid off at Spithead in 1750.

As far as can be learned from the manuscript volumes Spry seems to have had no more active service until November 1753, when he was made Commander of the "Garland." During this time his father George Spry of Place died, and he in turn became owner of the property, which he appears to have added to by purchase of adjoining manors.

The "Garland" was placed on preventive service around the Cornish coasts, and there is an interesting letter to the Admiralty, "chased three smugglers, two taken, one successfully dodged his boats and landed her cargo in Gerraus Bay. He is credibly informed by the gentlemen of this neighbourhood there are upwards of fifty sloops and boats go yearly to France from the adjoining parishes of Vryan, Gerrans and St. Anthony, and as he knows most of the people there would be pleased if their Lordships would be pleased to continue him on the Station."

Commander Spry's next ship was the "Gibraltar," a new 50 gun ship which although a fast sailer did not turn out to be especially satisfactory. In her he took one voyage to the North American Station, where the squadron under Keppel was shortly

ordered to Spithead. In the next year 1755 we find Spry in another ship the "Fougueux" which had been captured from the French and altered. Soon on the North American Station again we find Spry stating in despatches that "the French are active" and "have 11,000 men in Canada, and in the forts on the Ohio River."

The same year the Seven Years War began, and hostilities against the French were particularly active in America. Admiral Boscawen left for England towards the end of 1755, and Spry succeeded as Commander in Chief of the North American Squadron comprising 12 ships, of which the "Fougueux" was flagship.

Various successes against the French followed, many prisoners being taken, and various operations in the Gulf of St. Lawrence being carried out.

During 1756, there is an interesting note bearing on the disastrous earthquake at Lisbon, Spry fearing that it may have a disastrous effect upon British commerce. In the same year Captain Spry (the "Fougueux" being back at Spithead) is ordered with his officers to attend the execution of Admiral Byng on board the "Monarch" at Portsmouth.

In the general shuffle of commands which followed active hostilities against the French and Spaniards in European waters, Captain Spry received the command of the "Orford," a new 68, with which he sailed once more to join the North American Squadron early in 1757. During the two years which followed Captain Spry appears to have taken several ships in various actions and to have commanded several expeditions against the French. Lord Colville, Hardy, and Boscawen successively commanded the very large fleets on the North American coast at this time.

Amongst Spry's more important captures were a French 50, several privateers, and later the "Arc-de-Ciele," a large line of

battle ship with 700 men with many smaller craft. The "Orford" was a 68 carrying 520 men.

In 1759 Captain Spry in the "Orford" took part in the operations culminating in the capture of Quebec, and the deaths of Generals Wolfe and Montcalm. There is a graphic account of the struggle in the journal of the "Orford," which was in action. She reported being hulled in several places and a loss of 30 men killed and wounded. This was during the bombardment of the French forts and lines covering Wolfe's advance.

After this decisive victory a large part of the Squadron was sent home in great haste, being urgently wanted elsewhere. Accordingly after a hasty refit in 1760 the "Orford" was ordered to join Boscawen in Quiberon Bay after first convoying the East Indiaman "Onslow" 150 leagues into the Atlantic.

Later on Spry was detached with 3 frigates to try and intercept a small French Squadron which was threatening the Irish coast. This enemy was however totally defeated by another British Squadron.

Rejoining Boscawen the "Orford" was kept on active cruising service off the French coast until July 1760. During this period Spry was frequently in charge of blockading squadrons off Brest conjointly with Admirals Keppel and Buckle. There are some interesting letters from Keppel to Spry. In one Keppel notes that he "hopes Spry's letter to the Admiralty has made "them think that some of their favourites have had good cruising "enough in the roving way, and will now send them to our hard "meat."

And truly it was a hard task, in the depth of winter patrolling from Ushant to Finisterre "with scarce enough ships to keep the line." They get "6 gales in 7 days" and constant are the reports sent home of "foul ships," "short of water and short of fuel"; swept with scurvy and constantly at their difficult task of keeping the French fleet in Brest.

Captain Vane of the "Arethusa" is sent inshore to reconnoitre and on his return reports an action with three French ships.

The "Aquilon" is the best found ship, the "Ocean," a large 60, "is exceedingly crank . . . wants ballast" . . . and at last the "Orford" is obliged to return to the Hamoaze "being too foul to keep the seas, and both upper and after works being loose and very shattered."

She goes into dry dock, and Spry appointed to the "Mars," 74 guns, goes out once more to join Buckle off Ushant. At this time he was very ill, but although "much troubled with ulcers," and notwithstanding the Admiralty's offer to relieve him temporarily of his command, insists on going out. With the rank of Commodore he took charge of the squadron under Keppel in chief command.

Unfortunately, owing to a series of disasters, the whole fleet being at one time driven for shelter into Torbay, the bottled up French fleet escaped this time, being "7 sail of the line and 4 frigates," and Spry sent two fast frigates, the "Aquilon" being one, to Admiral Rodney at Barbadoes and Holmes in the Windward Isles, to acquaint him that the "hounds were unleashed."

Shortly after this, Hawke, the hero of the great victory off Ushant three or four years before, again took command of the channel fleet. Spry with a squadron of six ships still being kept cruising off Brest. Several interesting letters from Admiral Hawke to Commodore Spry occur in the journals.*

After much cruising, and but little fighting, the "Mars" reached Spithead in August 1762 to refit.

In and from 1766, Commander Spry was on the Mediterranean Station, and for the greater part of the time Commander in Chief.

*In 1761 Spry had the honour of being introduced to King George III. at St. James's Palace by Lord Anson "in recognition of his recent signal services."

In 1767, he hoisted his flag on the "Jersey" a line of battle ship, and the commission is signed by Buller and Keppel, two of the Lords of the Admiralty. A little later we find the fleet celebrating the restoration of Charles II with a salute of 21 guns. A curious echo of long past events.

These were the "piping times of peace." The first peace of Paris had been signed in 1763, ending the Seven Years War, and the struggle between England and her American colonies still seemed far off.

In 1767, Commodore Spry, now in the "Montreal," with most of his fleet, brought home the body of the Duke of York, who had died at Monaco.

Two years later, difficulties having arisen with Morocco, Spry with four ships was despatched as a British Ambassador to the Emperor carrying orders from the Admiralty to "meet the Moroccan Squadron in a friendly spirit, but if they had been hostile to British interest to destroy them." A rather summary way of enforcing peace!

In 1769, in recognition of these services, he was made a Rear Admiral of the Blue, and later Rear Admiral of the White with Commandership of the Plymouth Station. This was his last active Service. His flag was hoisted successively on the "Cambridge," "Dublin," "Torbay" and "Ocean" in Plymouth Sound.

In 1771, there was a series of interesting letters interchanged between Admiral Rodway, on the West Indian Station, and Admiral Spry at Plymouth.

There are not many items of interest in this journal. Impressment of sailors into the Navy ceased in 1771. In the same year "a Danish ship was forced into Falmouth harbour by Algerine corsairs contrary to the treaties of 1686 and 1700." The "Pomona" frigate was ordered out from Plymouth in a hurry to

try to intercept her but failed. This was of course long previous to the bombardment of Algiers by Lord Exmouth.*

In 1772, a thorough search was made for "wholesome shingle for ships' ballast (much of that on board being foul sludge) in all the creeks and coves between Dodman Point and Plymouth."

In 1773, Admiral Spry in the "Ocean," with the "Raisable," "Torbay" and three frigates joined the great naval review at Spithead, and was for his many services Knighted by George III at Portsmouth in the end of June in this year. He was also in the same year made an Admiral of the Red, hoisting his flag on the "Torbay."

Retiring in 1774 from active service Sir Richard Spry does not appear to have long enjoyed his rest after this long and well employed career, for he died at Place House in November 1775, at the age of 60.

Admiral Thomas (Davey) Spry his nephew who succeeded him, does not appear to have seen much active service. There are a few notes relating to various appointments in the manuscripts, from which he appears to have been a junior lieutenant during his uncle's commandership of the Mediterranean Squadron, being appointed a second lieutenant on board the "Jersey" in 1769, when he would have been about 17 years of age.

In 1778 he was a captain in command of first the "Pallas" and afterwards the "Europe" on the West Indian Station, but there is no account in the books at Place of his having command of other ships.

He became a Rear Admiral in 1795, a Vice Admiral in 1799, and an Admiral in 1805. He must therefore have held commissions during a very exciting period of history, but

*In consequence of the troubles with France and Spain, Admiral Spry was appointed to the command of seven ships of the line and two frigates, but although commissioned, this fleet was finally disbanded without being sent to sea at all.

with the exception of the one manuscript book dealing with the cruises of the "Pallas" and the "Europe," which would be during the American War, just previous to Rodney's great victory over the French and Spanish fleets in the West Indies, there is no manuscript account of any further service at sea.

Admiral Thos. Spry died at Tregolls near Truro in 1828, aged 76 years, and was buried at St. Anthony.

*A short account of the Spry Family, of Place, St. Anthony
in Roseland.*

In the Herald's Visitation of Cornwall in 1620, there are given two pedigrees of the family of Spry.

From these we find Thomas Spry, of Cutcrew, near St. Germans, occupying this estate previously to 1500.

"Bibliotheca Cornubiensis" gives the following information.

George Spry, of Cutcrew, St. Germans, was buried at St. Anthony in Roseland, and there is a monument to him in the Church. He was born in 1574, and died 1658.

His son Arthur Spry of Place, married twice, and monuments to both him and his two wives (1) Mary Gayer of Plymouth; (2) Lucy Hole of Bennetts in Whitstone, are in the church.

This Arthur Spry was M.P. for St. Mawes, 1660, on the return of Charles 2nd, and Sheriff of Cornwall in 1682. There is a monument to him in the Church.

George Spry, either his son or brother (it is obscure which), also of Place; Under Sheriff of Cornwall, and born at Place in 1649, married Mary Bullocke of Helston. According to the records, he died at Place, 1750, which would make him a very old man. It is therefore probable that there were two George Sprys of Place.

Admiral Sir Richard Spry, born at Place in 1715, was a distinguished sailor, even of that stormy period which added such laurels to England's glorious sea history.

Passing into the Navy in 1732, he seems to have been in active service almost the whole of his life, filling many important commands and being knighted at Spithead by George III. Especially important was his service, when for nearly three years he was one of the chief factors in holding the French fleet bottled up in Brest.

Admiral Sir Richard Spry died at Place, November 25th, 1775, and he was buried the 26th December, in St. Anthony Church, where there is a monument to his memory.

He was unmarried, and the estates passed to his sister's son, Admiral Thomas Davey who took the name Spry.

Although overshadowed by the fame of his more distinguished uncle, nevertheless the second Admiral Spry appears to have seen a good deal of service in 35 years.

He became a full Admiral in 1805.

The estates of Killaganoon and Tregolls, near Truro, were added by him to the family possessions.

He died at Tregolls in 1828, aged 76, and there is a monument to his memory in St. Anthony Church where he was buried.

His son, Sir Samuel Thomas Spry, was born at Place 1804, and died there in 1868.

He was a Deputy Lieutenant for the County of Cornwall, M.P. for Bodmin for many years and Sheriff of Cornwall in 1849.

He was knighted at St. James' Palace in 1834, by William IV.

His son, Mr. J. S. Spry is the present owner of Place.

Note.—Admiral Sir Richard Spry's records, full of the most interesting details of a lengthy sea service, are being annotated by the writer with a view of publishing some of the more interesting details in the next Journal of the Royal Cornwall Polytechnic Society.

Report of the Conference of Delegates of Corresponding Societies of the British Association.

Held at Birmingham, September 11 and 16, 1913.

<i>Chairman</i>	.	.	.	Dr. P. Chalmers Mitchell, F.R.S.
<i>Vice-Chairman</i>	.	.	.	Sir George Fordham.
<i>Secretary</i>	.	.	.	W. P. D. Stebbing, F.G.S.

FIRST MEETING, *Thursday, September 11.*

Dr. P. Chalmers Mitchell presided, the Corresponding Societies Committee being represented by the Rev. J. O. Bevan, Sir Edward Brabrook, Principal Griffiths, Mr. J. Hopkinson, and Mr. W. P. D. Stebbing.

The business was opened by the reading of the Report of the Corresponding Societies Committee. The Chairman then delivered his Address, entitled:—

Utility and Selection.

The greatest paradox of philosophy is that each of us is the only begetter of the universe in which we live, that the world is an extension of the individual mind. The hardness and roundness of a pebble exist because we think they exist; the stars of the high heavens twinkle in us; pain and pleasure, revolving time and illimitable space are qualities or categories of our mind. I have called it the greatest paradox, for a paradox is great in the proportion that it is true. The universe is a creation of the human mind, an artifact of the instrument that apprehends it. I am not here to discuss philosophical realism and idealism, or to expound the converse of the paradox. Those who lose them-

selves in the airy mists of philosophy are not to be pitied ; they may contentedly play by themselves the game of Hamlet with Polonius, doubling the parts.

Hamlet : Do you see yonder cloud that's almost in shape of a message from the dead ?

Polonius : By the mass, and 'tis like a message from the dead.

Hamlet : Methinks it is a spirit.

Polonius : It is disembodied like a spirit

Hamlet : Or like a spook.

Polonius : Very like a spook. *Hamlet, Prince of Denmark*,
iii. 2.¹

But I would remind you that if there be an objective reality, as we all must believe, of which our universe is a pale reflection, that reflection owes its character and its quality as much to the powers and imperfections of the reflecting instrument as to the objective reality. Our attempt to comprehend nature can be no more than an attempt to recreate it within the categories of the human mind.

Man has been defined as a rational animal, and there is no more persistent quality of his mind than the craving for teleological interpretation. He is uncomfortable in the presence of any phenomenon, until he is satisfied that it fulfils a purpose which he conceives to be useful. This point of view dominated the theologians and the rationalists of the eighteenth century, and in the nineteenth it led Darwin to one of the greatest triumphs of the human mind, and filled the armoury of the opponents of Darwinism.

If we can assign utility to a character in an individual, we agree readily that its possession by most individuals may be an advantage to the species in the struggle for existence. We agree also that as characters vary in individuals (whether the variations

¹ Unauthorised edition.

be large or small, continues or discontinues, does not affect the argument), the average of these in the members of the species may be intensified in the course of generations, if they fit the environment, or smeared and obliterated if they are out of gear with the environment. Having gone so far, we have accepted the main principle of Darwin's theory of evolution, a principle so harmonious with our mental disposition that it has become almost personified and has displaced the other gods in high Olympus. Many of the adherents of the new god have assigned to it an immanence of which Darwin did not dream. They believe it to be universal and all-powerful, and that the partisans of any other principle are like the ignorant heathen, bowing down to wood and stone. One of the disadvantages of this pathological distortion of Darwinism is not only that it has misled the elect, but has given a welcome opportunity to the crafty depreciators of the achievements of science, and to the clamorous advertisers of new theories. In attacking the excrescences of Darwinism, they persuade themselves and try to persuade others that they are establishing the bankruptcy of science, or clearing the way for their own nostrum.

I believe it to be historical truth that Darwin convinced the world of the fact of evolution by his exposition of the principle of natural selection, that no principle has been suggested before or since more in harmony with the observed facts of nature, or more congruous with the processes of human intelligence. Using for a moment the erroneous language of personification, which is so convenient to employ and so difficult to avoid, I believe that natural selection has been the active agent in bringing about evolution, and that in a sense it may be said to have produced the material on which it acts by the processes of summation and obliteration. But Darwin never even suggested that all characters came into existence because they were useful, that the marks by which systematists find it convenient to

distinguish species must be useful, or that the initial stages of a new character must be useful. Living beings are limited or determined by their inherited structure, by the inevitable necessities of their mode of growth and mode of living. Their parts and functions are linked by a thousand correlations, structural and functional, so that a change in any organ reverberates through the system. Living beings abound in characters and qualities of which no utilitarian explanation is possible. Such characters may be associated with other characters that are useful; they may have been useful in the past, in a different environment; they may never have had 'selection-value,' but a change in the environment or an alteration in the kaleidoscopic interrelations of the whole organism may give them 'selection-value.' They are material ready for natural selection, and so far from being vague and inchoate, may have a high degree of definiteness and complexity.

I propose to invite your attention to some examples of characters and qualities that, so far as we can see, are not present because they are useful.

The process of oxidation always accompanies living activity, and some of the chemical energy is liberated in the form of heat. Probably in plants and in the animals that we speak of as 'cold-blooded' the discharged heat is practically a waste product. The temperature of the tissues must be above freezing-point for the vital processes to be active, and each kind of organism has a euthermal range, a few degrees of temperature within which its organic processes succeed best. The heat produced by internal oxidation, however, does not appear to contribute in any important respect to the production or maintenance of the requisite temperature. Most organisms are ruled by the surrounding media, their activities rising and falling with the external temperature. If they have the power of movement or locomotion, they may turn or crawl to the sun, or seek the shade,

but changes of weather and the recurring seasons are the dominating factors in their lives. Even the higher reptiles depend directly on the circumambient media. A few years ago we improved the heating-system in the London Zoological Gardens, with the result that there was an increase in the frequency with which the reptiles fed, and a rise in their activities. If you wish a little torpid water-tortoise or a young alligator to take food, you must place it in a warm bath, precisely as many chemical reactions will not take place until you heat the mixture over a spirit-lamp.

Birds and mammals, the 'warm-blooded' creatures, have a fixed and rather high eutherma state, and depend chiefly on their internal production of heat to produce it. The normal temperature of the human body is 98·4° Fahr., and this may be taken as a fairly typical mammalian temperature, the normal for birds being a little higher. There is no more certain indication of illness, of the existence of something wrong in the bodily functions, than an important rise or fall in the temperature, and we feel ill even when the variation is small. Certainly we take notice of changes in the surrounding media, and after a time may be affected by them, so that we try to avoid extreme heat and extreme cold. But when we are in good health, the height of the barometer, the intensity of light, and the dampness or dryness, purity or impurity, of the air, affect us even more than the actual temperature. We rely on the physiological mechanism by which the production and waste of heat respond to surrounding changes and cause the actual temperature of our tissues to remain almost constant. Very young mammals or birds, and all warm-blooded creatures when they are ill, have a feebler control of their own temperature, and the heat metabolism of the body has to be assisted by a more rigorous choice of environment, if the normal temperature is to be maintained.

There is thus a marked contrast between warm-blooded and

cold-blooded organisms, which I may impress on you by asking you to compare an insectivorous bird and an insectivorous lizard. Both are swift and restless creatures which have to expend much energy in capturing their watchful and rapid prey. The alimentary canal and, so far as we know, the physiological processes of digestion are much alike in the two. The eutermal temperature is nearly identical, although the bird is more strictly limited to about 100° Fahr., and the lizard has a wider range. But the bird uses the heat of the oxidation processes in its own tissues to produce the temperature it requires, and so maintains its activity in spite of surrounding changes. If it be provided with suitable food, it can endure the cold of winter and heat of summer, and can adapt itself to a great range of climate and locality. The lizard cannot abide by its own production of heat; it is limited by the surrounding conditions, and becomes torpid or dies when the external cold is too severe or the external heat too great.

The evidence shows that warm-blooded mammals and birds are the descendants of cold-blooded reptiles. In the course of that evolution, the power of retaining and controlling the heat produced by oxidation in the tissues must have been acquired. No one can doubt the high utility of this power or its great advantage in the struggle for existence, as it widens the possible geographical range and increases the viability of its possessors. No one can doubt but that this kind of character would have come under the operation of natural selection. I desire to impress on your attention that the production of heat existed before it became useful. It was a waste product, an accident of the metabolism of the body, material ready for natural selection.

An important part of the provision for heat-regulation in warm-blooded animals is the coat of fur or feathers that serves to ward off the inclemency of the weather, and to prevent waste of internal heat by radiation and conduction. When small birds are roosting in the open air at night, their sleek plumage

becomes ruffled, each feather standing out at right angles to the surface of the skin, changing the smooth contours of the body into a globe of fluff. Exposure to cold similarly induces erection of the fur of most mammals, and the effect of cold on our own naked skins, that we call 'goose-flesh,' is doubtless a surviving action of the mechanism that erected the hairs of our ancestors. Such devices control the loss of heat to a notable extent, but they are far from complete. If we had organs as sensitive to radiant heat as our eyes are sensitive to radiant light, the bodies of warm-blooded birds and mammals would be perceptible to us in the dark, in inverse proportion to the efficiency of their heat-retaining covering. They would be perceptible in no vague fashion, but in what I may call some kind of contour, due to the different intensities of heat-discharge from differently protected parts of the body. There would be creatures radiating an even glow, flashing intermittently, banded, spotted, and irregularly surfaced.

If enemies of warm-blooded animals were armed with such a power of appreciating differences in temperature, the mechanisms for preventing loss of heat by radiation would acquire a new selection-value. Such enemies cannot be said to exist, but there is a suggestion of the possibility in the behaviour of ectoparasites. These seem to have some kind of directive heat-sense. Everyone who has had to handle the fresh bodies of dead warm-blooded animals must have noticed how quickly the lice and fleas migrate from the cooling corpse, and the frequency with which they find their way to the warm body of the anatomist seems to show that their wandering is not aimless. The concealment of heat-radiation does not seem to have had any importance in the evolution of animals, but if the necessity should come to pass, a character already exists which could be turned to advantage.

I am not certain that this accidental radiation of heat has ever become useful to animals, in the fashion in which the production

of light, a parallel side issue of oxidation, has been turned to account in many groups. I say I am not certain, for I remember that heat-radiation plays a part in the relations between young warm-blooded animals and their parents, and possibly in the relations of gregarious creatures. Long after the heat of the mother has ceased to be necessary to the feeble young, it remains an attraction. Those who have had experience in the rearing and taming of young birds and mammals know how fond these are of heat, and how readily they will find their way and attach themselves to non-luminous sources of heat, such as the human body, the warm corner of a room, or the surface of a radiator. Successive mammalian pets of my own, belonging to different groups, have selected the same corner of my dressing-room, where hot-water pipes emerge for a few inches on their way to a bath-room, and have picked out the same ways of getting to the same radiators. Warmth is a surer attraction to a young mammal than food, and if at any time it should become more important to the survival of animals that they should have additional means of finding their mothers, heat-radiation and the incipient heat-sense are ready to be used.

A few hours before I began to write these words (on a hot day in August) my attention was attracted by brilliant points of light in a flower-bed in the Zoological Gardens. It was too late in the day and too hot for dew-drops, and the points sparkled with an acuter, more coloured scintillation, like diamonds of the finest water. I found the source in the ripe blooms of a Solanaceous plant (*Salpiglossis emperor*). The tip of the style was a cross-piece like the arm of a crutch, and its upper surface bore a narrow, elongated, and deeply-grooved stigma. The sticky exudation formed a brilliant mirror in the hollow of the groove, and the curvature of the surface was such that the reflection of the sun met the eye as a single, acutely shining point of light. I have never seen anything more hardly brilliant in a living

organism. The flowers were being visited by numbers of small flies; they emitted a sickly odour, and their colours were conspicuous. I watched for some time, but could not make out that the flies were attracted by the shining point, which indeed was visible only from a particular angle. They alighted on any part of the corolla and crawled indifferently over the inner surface of the flower. Here is a character, startlingly definite and conspicuous, and yet apparently only a side issue of the mechanical shape of the stigma and the production of the sticky juice. But if it should happen that diurnal insects exist which are attracted and dazzled by such a shining point of light, as we know that nocturnal insects are attracted by a source of light, a lure is there, appearing at the right moment and fully perfected.

We know that the emission of odours is frequently utilitarian. It is the chief means by which insects are attracted to flowers that bloom by night, and the plants scatter their perfumes on the air only when ripe for fertilisation. It is possible that the odours of the stem and leaves of many plants are distasteful to animals, and ward off their attacks. Among animals the emission of odours is the chief sexual lure and the awakener of the sexual reflexes, and no doubt it serves also to secure recognition between parents and offspring, and amongst the members of gregarious tribes. But there are many odours, just as definite and characteristic, which we cannot imagine to be useful. Almost every plant and the different tissues of a plant, almost every animal and the different tissues of an animal, can be recognised by the sense of smell. I may take a single example. In the course of anatomical work I have had to examine the digestive tract of many hundreds of birds, belonging to practically every group. It is a curious and remarkable circumstance that the intestines offer scents, even to a nose not highly skilled, racially or individually, that are almost as characteristic of the families as are the patterns formed by the intestinal coils, blood-vessels, and

mesenteries. The nature of the food, the processes of digestion, the varying kinds of putrefaction, all contribute to the result, but the product, so to speak, is accidental, and cannot be imagined to have any utility.

It is with regard to the colour and pattern of living things that the craving of the human mind for teleology has led to the greatest excesses. I do not wish to suggest that colour and pattern, and the combination of the two sometimes called colouration, are never useful. I have no doubt that they serve a purpose in the interplay of the sexes, that they are useful in the various fashions described by Darwin, Poulton, and Abbot Thayer, and that they have played a large part in the success and failure of races. But I wish to remind you that they are inevitable outcrops of the structure and physiology of living organisms, and that, howsoever they may have been altered under the agency of natural selection and sexual selection, they must have existed and will exist so long as life endures.

Pattern is essentially a repetition of parts, and is the result of the mode of growth of organisms. A few scraps of tinsel and coloured glass placed in the well of a kaleidoscope form indefinitely varying patterns as the tube is revolved and they fall into different places. The geometrical patterns are formed by the reflections from a set of mirrors in the bottom of the tube, placed so as to multiply the images. If irregular holes be torn in a sheet of paper that has been doubled and redoubled, a symmetrical pattern is visible when the sheet is unfolded. Growth of tissues takes place by the multiplication of cells, cell-masses, organs, and parts of tissues and organs, for there is a physiological limit to increase in size of the different units of the body. Thus repetition patterns occur inevitably, producing the various kinds of symmetry, radial, concentric, metameric, antimeric, and so forth, which are characters of living things so conspicuous that even the untrained eye at once distinguishes a fossil in the rocks or a shell

on the sand from its contrast with the formless monotony of surrounding matter.

The multiplication or repetition of cells or parts may take place regularly, radiating in every direction from the growing point, until the product of one centre of growth is modified by the different conditions it meets on different parts of its periphery, by interference with the products of other centres of growth, or by the changed conditions of nutrition brought about by its own growth. Growth in one plane or radius may be arrested, in others proceed with greater vigour; so that annual systems spread out into curving streaks, like the stream-lines on the surface of muddy water, or it may be subjected to local, temporary, or seasonal intermittences, with a consequent elaboration of pattern. In its finest details and its gross structure every organism displays pattern.

When the microscope reveals the exquisite sculpturing on the surface of a scale, the graceful details of the cross-section of a stem, or the intimate beauty of tissues like brain, or liver, or kidney, we are not tempted to explain the patterns on utilitarian principles. We propound no theory of mimicry, or of protection, or of sexual advertisement, but are content to accept their presence as an organic fact. But when the growth patterns reveal themselves on the surface as the markings on a shell, the stripes on a skin, or the vermiculations on a feather, the craving for teleology is aroused. I do not doubt but that these natural patterns have provided material for selection, but chiefly in the sense that they have been obliterated where they were visible. No assemblage of living animals shows externally visible growth-pattern in a more conspicuous fashion than the members of the abyssal fauna, where the only light is a dim and fitful phosphorescence, and where conspicuousness can be attended with no disadvantage.

Organisms, like all visible things, must have colour, and it is still less necessary than in the case of pattern to suppose that the colour as such subserves a useful purpose. We do not ask what advantage it is to one form of carbon that it should be black and opaque, to another that it should appear a crystal of the rainbow, why calomel should be white, mercuric iodide scarlet, or what gain it is to the sea that it should display its deepest azure when we are shivering under the blast of the mistral. Many of the most brilliant colours, the shifting metallic sheens, are the direct result of structure. The incident light is broken up when it is reflected from a sculptured surface, as in the case of the shining glow of a pearl, the inner face of a shell, and the shifting brilliance of a rifle-bird's throat, or by reflection from an opaque surface through a transparent layer, as when the swim-bladder or the sheath of a tendon display the shivering hues of a mirror of polished silver. The pearl grows as a disease of the tissues of the oyster, hidden away from light, not revealing itself until the animal, dredged up from the bottom of the sea, has rotted into a putrid mass. The internal tissues of every creature reveal a multitude of iridescent surfaces only when the dissecting knife lets in the light. A still larger number of colours are due to pigments, blues and greens more rarely, reds, yellows, blacks and browns almost invariably. Perhaps in most cases the pigment has a direct physiological importance, as, for instance, the red colour of the blood, due to the presence of hæmoglobin, the substance that carries oxygen to the tissues, or the green chlorophyll of plants, by which the radiant energy of sunlight is captured. Others are by-products of excretion, poisonous waste that has to be removed, like the brilliant derivatives of bile and urea. Extreme instances of the casual or accidental production of colour may be seen in the crimson of turacos, which is not merely a pigment, but one that is soluble in rain-water. The Malay tapir exudes a black sweat, and that of the hippopotamus

is carmine-coloured. Still more suggestive is it to reflect that not only the visible surface of the body may be resplendent with vivid hues. The blood runs as red under the thick and hairy hide of an ape as on the fair cheek of a girl. Splashes and streaks of black, glows of yellow and green and scarlet, vivid contrasts of colour, diversify the internal organs and tissues, where they can delight the eye only of the anatomist, who, after all, is a small part of the economy of nature. Ruskin once said it was immoral if the back of a column, destined to be invisible to every eye from the moment it was put in place until the cathedral crumbled, were not carved as fairly and lovingly as the side that was to confront the world. In her dispersal of colour nature is of the school of Ruskin, and no parsimonious utilitarian, scamping the invisible part of her work. Colour is lavished freely on creatures that rejoice in the sun and that seem consciously to flaunt their brilliance or coyly to match their surroundings, but it is lavished no less freely on internal parasites, creatures of the night, inhabitants of clefts in the rocks, or of the dim abysses of the ocean.

Colouration (the combination of colour and pattern) is in a sense accidental. A thin slice of almost any living tissue placed under the microscope reveals little of its structure because of the uniform grey of protoplasm. The skilled microscopist stains his sections, and as the different parts react differently, the uniformity disappears and the structure becomes visible. In the same fashion, in the laboratory of nature colour often magnifies or intensifies pattern. Differences in texture of the component parts of the structural pattern may reflect light differently, so that iridescent hues map out the lines of growth. The bright exudations of the body reveal differences in the texture and substance of the tissues they reach, or the structural distribution of blood is made visible by the scarlet hæmoglobin. The combined effect is so conspicuous that we deem it must have a

purpose. It is curious, however, to note how much inconspicuous pattern exists amongst animals and plants. The black variety of leopards and jaguars is a familiar instance; it is just possible to see, like a faint water-mark, the characteristic rosettes of the leopard or the jaguar on the uniform black fur. It may be said that these melanistic forms are abnormal, almost pathological; but there are many cases for which no such explanation can be offered. The young of almost all the cats, great and small, are spotted or striped, even if the adults are self-coloured. The kittens of cheetahs, or hunting-leopards, appear to be a remarkable exception, for, although the yellow fur of the adult is thickly set with black spots, the young are clothed with soft fur of a uniform pale grey; but closer examination shows that the under fur is spotted. Ray Lankester has called attention to the almost invisible pattern of stripes on the face of the young giraffe. The cony or hyrax is really a striped animal; when the creature is alive one can see in appropriate light that the hair is set in hoop-like bands running downwards from the dorsal middle line, but the uniform colouration masks this arrangement. I have almost no doubt but that the African rhinoceros is similarly a striped creature, the stripes appearing as structure and not as colouration.

The striped pattern of zebras is a salient instance of the combination of structure and colour, and there is excellent reason to suppose that it has been turned to a utilitarian purpose, and helps to protect the animal by making it less visible against a background, or merely by breaking up its outline and so making it less like an animal. But it passes belief to suppose that the different types of pattern found in Grevy's zebra, the Mountain zebra, and Burchell's zebra have different and appropriate utilities. They are the outcrop of different structure, of similar, but not identical, material. The fate of the zebra pattern in hybrids shows that structure, and not utility, is at the root of the

matter. When a zebra is crossed with a donkey the hybrid has a smaller number of stripes, but these are very vividly marked, one along the dorsal middle line, one or two on the shoulder, and many on the legs. When it is crossed with a horse the hybrid is much more fully striped than the zebra parent, but the stripes are faint, almost invisible. Nor can it be supposed that the patterns characteristic of the different races or species of giraffe have separate utilities, although each of them may serve equally for protective concealment.

Although colour and pattern may combine to produce a result, the colour differences accentuating the structural differences, it frequently happens that the outlines of colour and pattern do not conform. In such cases the separate factors produce a result that is in a sense accidental, and that, although it may be useful, cannot have been produced because it was useful. Ruskin, who was an acute observer of natural objects, called attention to this in his chapter 'The Lamp of Beauty' in *The Seven Lamps of Architecture*. 'I am quite sure,' he wrote, 'that any person familiar with natural objects will never be surprised at any appearance of care or finish in them. That is the condition of the universe. But there is cause both for surprise and inquiry whenever we see anything like carelessness or incompleteness; that is not a common condition; it must be one appointed for some singular purpose. I believe that such surprise will be forcibly felt by anyone who, after carefully studying the lines of some variegated organic form, will set himself to copy with similar diligence those of its colours. The boundaries of the forms he will assuredly, whatever the object, have found drawn with a delicacy and precision which no human hand can follow. Those of its colours he will find in many cases, though governed by a certain rude symmetry, yet irregular, blotched, imperfect, liable to all kinds of accidents, and awkwardnesses. Look at the tracery of the lines on a camp shell, and see how oddly and awkwardly its tents are

pitched. It is not, indeed, always so; there is occasionally, as in the eye of a peacock's plume, an apparent precision, but still a precision far inferior to that of the drawing of the filaments which bear that lovely stain; and in the plurality of cases a degree of looseness and variation, and still more singularly, of harshness and violence in arrangement, is admitted in colour which would be monstrous in form. Observe the difference in the precision of a fish's scales and of the spots on them.'

Analysis of the differences noted by Ruskin would probably show that when there was a coincidence of colour-outline with pattern-outline, the colour was fundamentally structural character, that is to say either the result of interference and reflections, or of chemical differences in the different parts. In so far, the colouration would be in a sense accidental, a secondary result of the pattern. When the colour does not conform with structural lines, it is most often pigmentary, an exudation of the products of excretion staining the surface according to the osmotic conditions, or the relation of the internal organs to the external covering. Here again the total result of pattern and colour is still more accidental, due to uncorrelated factors. The work of the most modern school of painting, with its display of startling primary colours, and its insistence on masses rather than on outlines, is training us (in a fashion that doubtless would have been most repugnant to Ruskin, and that he would have denounced in language as vivid as a canvas of Matisse), to see beauty in combinations that we have been accustomed to regard as incongruous, and to comprehend harmony and design without the aid of the familiar scaffolding of outline and perspective. I admit in the fullest way that nature may be a better guide than our acquired prepossessions, and that colour may show its highest value when it is divorced from form. I wish only to remind you that pattern is an inevitable outcrop of structure; that there must be colour, and that there must be combinations

of colour and pattern. The living world, even if selection had played no part in moulding it, would still be a shining wonder, infinitely diversified.

In the two groups of the animal kingdom with which I am most familiar, there seems to be a general process, rather different in the two cases, according to which the evolution of colouration has taken place. In each case there has been a transition from patterns that are the plain consequence of growth-forces, such as the simple geometrical markings which are structure revealed, through more irregular stripes and blotches, which may be set down to irregular growth, first to a uniform colouration which obliterates the structural form, and lastly to odd and brilliant disguises of the true contours of the body. I do not doubt but that natural selection has attended each stage of the process, now rejecting and now favouring the patterns that have emerged from the laboratory of nature, as they turned out to be harmful or useful.

Comparison of the lower and higher groups of mammals and of the earlier and later stages of individuals would appear to lead to the inference that primitive mammals were spotted or striped. Spots and stripes become increasingly frequent as we pass from the higher to the lower groups. If the adults are spotted, the young are, I believe, always spotted; if the adults are striped, the young are always either spotted or striped; when the adults are self-coloured, or when they display the strange markings which conform with none of the structural lines of the body, and which Abbot Thayer has interpreted as 'ruptive' or outline-breaking, the young are striped, spotted, or uniform.

Man and his allies, the apes, monkeys, and lemurs, compose what we must regard as the highest group of mammals, and among them stripes and spots are extremely rare in the adult or in the young, the most obvious cases being the rings on the tails of lemurs. The tiger, leopard, jaguar, and cheetah are familiar

instances of striped and spotted carnivores, and their young are always striped or spotted. But the young of the self-coloured lion, puma, and caracal are spotted, and lynxes, which are greyish-brown in the adult summer coat, are brilliantly spotted with black when young. Small carnivores such as civets and genets, binturong and ichneumons, have many striped and spotted forms, and here, again, the young of the striped and spotted creatures are always striped or spotted, and the young of the self-coloured animals are not infrequently striped or spotted. Antelopes are not often striped or spotted, but the banded duiker, which is marked with hoops across the back, has young with a similar pattern. The South African eland shows almost no traces of striping when it is adult, but the calves have barrel-like hoops of white, and in the Derbian eland and the kudus, where the stripes persist through life, the young have them more strongly marked. Sitatunga antelopes are nearly devoid of stripes in the adult condition, but their young are brightly striped and spotted. The bongo and angas antelopes and the beautiful harnessed antelopes are striped, although the stripes tend to disappear in old bulls, and their young are vividly striped. The young of a large majority of different kinds of deer are spotted; sometimes the spots are retained throughout life; sometimes they are found only in the brighter coats of summer, sometimes they disappear altogether. But I do not know of any spotted deer with self-coloured young. The young of true wild swine, pygmy hogs, river-hogs, and wart-hogs are marked with longitudinal stripes that disappear in the adult. The young of the American and Malay tapirs are striped and spotted. Spots, dapplings, and stripes are more common in foals than in adult horses and asses. The foals of all the zebras are vividly striped, and there seems reason to believe that the less striped forms are the descendants of forms that were more fully marked. Among the rodents many are marked with stripes or with spots arranged in

longitudinal rows, and the young of the striped forms are always striped. A good many marsupials are spotted or striped, and precisely the same condition obtains; the young of the striped or spotted animals are always striped or spotted.

The suggestion was made many years ago, I think first by Dr. Bonavia, that these spots and dapplings, so frequent and so plainly ancestral were legacies of a primitive coating of scales like the armour of armadillos and of their gigantic extinct allies, and it is at least a fair speculation that they are to be associated with the scaly covering of the reptilian ancestors of mammals. Without pushing the argument to this extreme, we may at least assume that the presence of spots, reticulations, and stripes (the latter being expanded spots or fused rows of spots) are indications or revelations of the composite nature of the skin, which is not merely a uniform sheet stretched over the surface of the body, but a structure growing from many centres. Like the cranial and spinal nerves, these centres were no doubt fundamentally segmental in character, but by unequal growth, areas belonging to one segment occasionally have invaded neighbouring territory, and the primitive regularity has become disguised, and tends to be more and more disguised in the course of ontogeny and phylogeny. In such anatomical and physiological facts we must seek for the origin of the primitive patterns of mammals. No doubt in many cases they have been retained and perhaps accentuated by selection. But selection does not and cannot account for their origin. It seems to me in many cases incredible that they are utilitarian. In the young of many animals, they may serve for protective concealment, but they occur almost with equal frequency on the least visible portions of the body, on the under parts and legs, and in the case of creatures whose young are carefully hidden and sedulously guarded by the parents. The general trend of events seems to be the obliteration of these primitive patterns, and their replacement by an even tone. The

even tone, in its turn, is being replaced, especially in the males, by countershading, and by many of the odd and brilliant patches and marks which may be interpreted as decorative sexual colouration or as raptive, outline-breaking patterns. Where the young are neither striped or spotted they are more uniformly coloured than the adults, and slowly acquire the adult condition, the females more slowly than the males.

The trend of events in birds is similar but not identical. The kind of plumage most common in the lower types of birds and that appears most frequently in young birds is a rather uniform dull brown or grey, marked with patterns of stripes and spots and mottlings symmetrically arranged with regard to the whole body and to the individual feathers. Many of these primitive patterns and colourations suggest the accidental expression of structure, and can be imitated in a very close fashion by mechanical means. Certainly they appear to serve for protection, and blend with rough and mottled backgrounds in a very complete fashion. But, just as in the case of mammals, they often occur on parts of the body not naturally the most exposed, or in cases where protection is secured by other means. At first the plumages of the young and of adult males and females were similar and retained throughout the year. Next, during the breeding season, the males began to assume brighter colours, and when the breeding season was over, relapsed into the duller ancestral plumage, passing into the condition usually spoken of as 'eclipse.' In such a stage, the males in eclipse, the females and the young were all much alike, and there are many birds in which this condition is retained. A later modification came about when the females as well as the males began to assume brighter tints in the breeding season. When the breeding season was over, males and females both went into eclipse, with the result that males and females in eclipse, and the young in their early plumage, were all much alike, and wore a plumage recalling

the ancestral condition. This stage persists in a large number of cases. Then the period during which the breeding plumage was retained became longer and longer, half the year in some of the weaver birds, for all but a few weeks in the game birds and in most of the ducks, or for the whole year, as in South American ducks, kingfishers, and parrots. Every stage in the suppression of the eclipse or ancestral plumage still exists; in some of the game birds and tanagers, for instance, it is represented only by a few feathers. When the eclipse plumage has been suppressed, only the young birds retain the dull ancestral livery, and there are many cases in which even the newly fledged birds, or birds in the first down, show traces of their future brilliancy.

I have attempted not to weary you by going into much detail. I have been trying to show you that amongst birds and mammals there has been a general change from dull colours and mechanical patterns to brilliant and fantastic garbs, an intermediate stage of almost uniform colouration having been passed through. The process has been an inevitable outcrop of organic growth, a naive blossom of the tree of life, as free from purpose as art is free from morality. It has been associated with an increase in the vigour of the body and a heightening of the vital activities, so that growth, respiration, and excretion, and all the chemical changes in the living laboratory, have become more exuberant. It is natural, therefore, to find the beginnings of more brilliant colour and more abberant growth associated with the breeding season, for it is then that the strength and vigour of the animal body are most acute. No doubt there were critical stages during which natural selection played a great part; most notably the suppression of the primitive geometrical growth patterns which are most abundant in situations where they are least seen, more abundant in young creatures than in adults, and in lower groups than in higher groups. The later stages, in which dull uniformity has been replaced by exuberance of colour and extrav-

agance of form, may have secondary utilities either as stimulants to sexual activity, acting through the organs of sense, or from the fashion in which they disguise the natural outlines of the body. But I have tried to submit evidence that even if natural selection and sexual selection had not been at work, there still would have been a gradual increase in the fantastic beauty of the organic world, as growth became more complex and metabolism more active. At the least there is nothing more superfluous than to object to the theory of Darwin, that it cannot explain the existence of material for selection. The circumambient media, pressing on the obstinate living organism, mould it by processes of selection and rejection, but the material is there, a varied yet inevitable product of inherited structure and function. These are the

‘Hierarchs and Kings

Who from their thrones pinnaced on the past

Sway the reluctant present.’

SIR GEORGE FORDHAM proposed and Mr. H. D. ACLAND (Royal Institution of Cornwall) seconded a hearty vote of thanks to the Chairman for his valuable address which was carried.

SIR GEORGE FORDHAM, on being called on by the Chairman, outlined the arrangements which were being made by the French Association for the Advancement of Science, and the invitation from that body to the Conference of Delegates to hold their meeting next year at Havre during the meeting of the French Association. He said that the Conference must definitely settle now if it will accept the invitation. Although the British Association could not meet in a foreign country, there was nothing in the rules to prevent the Conference meeting where it wished. The Council of the Association had accepted the invitation of the French Association on behalf of any of its members who might like to attend the meeting at Havre. The wording of the section of the Report of the Council for 1912-13 relating to this matter is as follows:—

(d) A letter has been received from Dr. A. Loir, of Havre, Local Secretary for the Meeting of the French Association for the advancement of Science in Havre in 1914, intimating that the municipality of Havre desires to invite as guests leading Members of the British Association who do not attend the meeting in Australia, and that all Members not attending that meeting will be welcomed at the meeting of the French Association ; also proposing that the Conference of Delegates should meet in Havre. Information has also been received from Dr. Loir that a Local Committee, including some of the principal British residents in Havre, has been formed for the reception of Members of the British Association.

It was resolved that the invitation be cordially accepted in general terms, and that details of the arrangements be left to the consideration of the President and General Officers and a committee appointed to assist them.

The opening meeting of the French Association will be held on August 4.

DR. A. LOIR, on the invitation of the Chairman, confirmed what Sir George Fordham had said about the invitation of the French Association to the Conference of Delegates, and said that the matter was being taken up enthusiastically by the City and Municipality of Havre.

MR. G. C. DRUCE (Ashmolean Natural History Society of Oxfordshire) regretted that holding the Conference in Havre in August would prevent members going to Australia from attending it, which they would be able to do if the Conference was held in London in November, as was the case when the Association went to South Africa.

On the Chairman asking for a vote on the desirability of the Conference of Delegates meeting in Havre in 1914, it was proposed by MR. JOHN HOPKINSON (Watford Camera Club) and

seconded by MR. A. W. OKE (Brighton and Hove Natural History and Philosophical Society) that the meetings of this Conference of Delegates be held next year at Havre on the occasion of the meeting of the French Association for the Advancement of Science. To this MR. H. D. ACLAND proposed an amendment that the Conference of Delegates should first meet in London and carry out a part of the business of the Conference and then adjourn to Havre. This was seconded by MR. BRYAN CORCORAN (Croydon Natural History and Scientific Society). On being put to the vote the amendment was lost, eight voting in favour and fifteen against. No other amendment being brought forward, Mr. Hopkinson's proposal was put to the meeting and carried as a motion to be brought up at the meeting of the Committee of Recommendations by the Vice-Chairman of the Conference.

In the absence of the Rev. William Johnson, who was to open a discussion on 'The Relationship of Local Museums with Educational Institutions,' the Conference was adjourned to the 16th.

Mr. Johnson wrote later that an accident to his hand prevented him from attending the meeting of the Association.

SECOND MEETING, *Tuesday, September 16.*

In the absence of the Chairman the Vice-Chairman took the chair *ad interim*, the Corresponding Societies Committee being represented by the Rev. J. O. Bevan, Sir Edward Brabrook, Mr. W. P. D. Stebbing, and Mr. W. Mark Webb.

The CHAIRMAN reported that at the meeting of the Committee of Recommendations he had brought forward the Conference's resolution that it should hold its meetings next year at Havre, and that after discussion the matter had been referred to the General Committee.

The REV. J. O. BEVAN (Woolhope Naturalists' Field Club) thought that there might be an informal meeting of the Delegates in Australia, and that the official meetings might take place afterwards in London.

Mr. W. MARK WEBB (Selborne Society), asking if there was any rule preventing the Conference from meeting in Australia, was informed that it met in Toronto on the occasion of the British Association's visit there in 1897.

Mr. H. D. ACLAND suggested that Delegates should be sent to Australia not to hold a Conference but to keep in touch with the work of the Association. He was hoping to go to Australia.

Mrs. JULIAN (Torquay Natural History Society) having spoken in agreement with the remarks of the last speaker, the meeting decided, on the motion of Mr. A. W. OKE, seconded by Mr. W. M. WEBB, to proceed with the next business.

The following subject for discussion was brought forward by Mr. A. R. HORWOOD (Leicester Museum):—

Scientific Societies and the Control of Plant Extirmination.

By A. R. HORWOOD.

The resolution which this Conference passed last year relative to the aim (if not the work) of the Plant Protection Section of the Selborne Society has encouraged and stimulated the Section to further endeavours.

As a consequence an appeal was made to the scientific societies in this country to support the work in a definite way by the appointment of a corresponding secretary who might keep in touch with the Section and continuously advance the work *locally*, in the *special* way demanded by each district.

The necessity of some such method of decentralisation had long been apparent to the Section working from headquarters in London. It was felt impossible for the Committee, however large and energetic, to do what a body of willing and intelligent workers in each district might do locally. Indeed, the organisation of and correspondence with such a body of workers is in itself a large enough task, together with the planning of the *modus operandi* for securing the aims of the Section. For many reasons men on the spot with local knowledge and interest are

essential to the success of this or any other wide-spread and far-reaching movement.

As a result of the appeal made to some 300 secretaries (though I have not full or final details as yet, as reports have to come in later from a large number of societies) nearly 100 corresponding secretaries have been or will be appointed.

As in the British Isles there are 117 counties (as defined by H. L. Watson, including vice-counties), one might be disposed to stop here, but since some counties have no efficient societies, whilst others, *e.g.*, Yorkshire, have a great number, an endeavour has been made to appoint one secretary at least in every county, and in the case of counties not represented by any society the Section has appointed district secretaries in place of corresponding secretaries. But of the 117 counties I may say that between one-half and two-thirds are represented by a secretary in touch with us, a decidedly encouraging result. But this was not done at once; several appeals had to be made before a single reply was received, usually because of absence, of deferred meetings, &c., and nearly a thousand appeals were sent, involving various replies, to obtain this result.

To each corresponding secretary nominated by a Society, after application to the secretary, the following suggestions for local work were sent as a basis for his or her own active campaign:—

Suggestions for Local Societies.

It is suggested that your Society might possibly carry out the following programme as far as it can be adapted to local needs:—

1. Choose a member to act as a corresponding secretary who would keep in touch with the movement and report measures adopted, or instances of extinction.
2. Constitute itself a local body ready to:—
 - A. Inform the Recorder of any cases of extinction, with their causes, and send photographs of sites as well as definitely compare present records of the flora with earlier ones.

- B. Educate the people locally by means of the Press as to the importance of plant protection.
- C. Help to distribute information and display notices as to plant preservation (to be obtained from the Selborne Society).
- D. Memorialise the County Council to obtain a local order for plant protection, and secure signatures to a petition for legislation (a Bill is being prepared).
- E. Endeavour to create locally a public opinion against the too abundant collection of plants.
- F. Work to obtain the purchase of tracts that need reserving, and discuss with the Selborne Society the formation of sanctuaries where needed.

A quarterly report should be sent as to facts ascertained (A and F), progress made (B-E), and help and advice needed.

In addition to such work, the Section proposes to obtain the help of the secretaries in obtaining data in each area as to the need for the reservation of any tract of land, or the protection of any particular plant. This will be in the nature of registration, as followed out in Prussia, and in exceptional cases exact maps of such areas may be required.

This is an era of land-inquiries, and as one of the most important aspects of plant-protection has to do with the estates of landowners, who as a body could help in the work of protection, and as much depredation is carried out upon their property, their assistance is to be sought in protecting plants, and it is proposed to ascertain who are the landowners in each district, the extent of their property, and so on. In this way, if local orders (as is hoped) become general, then the Section can lay down all the machinery necessary for the carrying out of protection without the creation of a single extra official, which is the only objection made to this method of preservation. The necessity for organisation is obvious.

Too great emphasis cannot be laid upon the great principle of co-operation, without which no work of this national character can be done. One is even led to suggest the federation of all such conserving bodies for common strength and unity. But the present attitude of harmony towards each other is all that can be expected so far, so diverse are the objects in view.

In this campaign one thing is of paramount importance, the necessity of promoting a public opinion upon the matter. Prevention is better than cure.

The deliberate efforts made towards the proper safeguarding of national monuments abroad must be the pattern by which we must work. Though much remains to be done in this country, yet much has already been done. There must inevitably be divergent opinions as to how it is to be done, who is to do it, and so on, but these discussions surely do more good than harm.

And it is surely *the* work of scientific societies, since the material to be preserved is that upon which such bodies are continually engaged in research, and its conservation is a principle to which each society must subscribe.

I would ask that as practical a result of this discussion be arrived at as was achieved last year; that is, the unanimous voice of the Conference upon the desirability of organised effort.

With the approval of your Secretary and that of the Chairman of the Section, I submit to you a resolution, which I wish to have sent to every member of Parliament in the country through the corresponding secretaries or, in default, by the Section, asking them to approve the principle of State protection and the framing of a Wild Flowers Protection Act.

¹[‘That this meeting of the Delegates of Scientific Societies gathered in Conference at the meeting of the British Association for the Advancement of Science at

¹ The resolution carried is put in square brackets.

Birmingham, September 16, 1913, records its opinion that the time has arrived when the question of the protection and preservation of wild plants demands the attention of Parliament] by the appointment of a Commission to recommend the enactment and endowment of such a measure by the State, and the passing of an Act to make and enforce regulations required.'

It is proposed to get each secretary to send a copy of this resolution with Leaflet No. 1 to his M.P., with a request for a reply and an expression of opinion.

These replies would be collected by the Section, and a definite estimate formed of the possibility of success and the best means of attaining it.

Meanwhile, the work of the Section will be to collect data which will serve, when a Commission is appointed or a measure brought forward, to provide reasons for its promotion. This method is calculated to save delay.

The CHAIRMAN, speaking on the resolution suggested by Mr. Horwood, thought that it was rather cumbrous and that it would be almost impossible to get a Royal Commission appointed.

After discussion on Mr. Horwood's resolution by Sir Daniel Morris (Bournemouth Natural Science Society) and Mr. Joseph Wilson (Essex Field Club), Mr. WILSON proposed an amendment to the resolution that all the words from 'Parliament' to the end be omitted. This was seconded and carried.

MR. T. SHEPPARD (Hull Scientific and Field Naturalists' Club) said that he was not sure from what benighted parts of the country the various delegates present might have come, but he could assure them that in the North they were sufficiently civilised to look after their botanical treasures without such drastic measures being taken. The Yorkshire Naturalists' Union, with its forty affiliated societies, and nearly 4,000 members and associates, had for many years taken the greatest possible

interest in the preservation of the flora and fauna of the county, some of the more interesting localities being protected by watchers paid from the Union's funds. Nor did they, in Yorkshire, find that serious harm was done, either by collectors or herbalists. After many years' work he felt that in Yorkshire, and surely in other parts of England as well, the various societies were doing much more good in looking after their floral treasures than harm in collecting them. In fact, he felt that the professional or amateur 'collector' was an exceedingly rare individual; one reason being his difficulty in disposing of large quantities to advantage. He was sure that Yorkshire botanists would resent any action being taken which would interfere with the present very satisfactory state of things.

He also resented interfering in any way with the landowners, either by making suggestions to them or by giving them additional powers. From many years' experience with landowners (as secretary to his society) in all parts of Yorkshire, he had found that they were invariably willing to give every facility to natural history societies to roam over their estates, and he believed that during the very many years in which this privilege has been given to Yorkshire naturalists, on seven or eight occasions each year, there had not been a single instance in which the privilege had been abused. In the suggested powers that it was proposed through Parliament to give he saw grave danger to this present state of things being interfered with.

In other respects, the suggestions now made had already been adopted by several societies many years ago.

He also, as representative of one of the largest societies in the Union, resented the suggestion that all these various societies should come under the wing of the Selborne Society in this so-called protective scheme. He did not wish to deprecate in any way the excellent work the Selborne Society was doing, but he felt sure that many societies whose delegates were present felt

that they were able to continue the work they had been doing for many years without being connected with the Selborne, or any other society of that kind.

MR. WILLIAM WEST (Bradford Natural History and Microscopical Society), as an ex-President of the Yorkshire Naturalists' Union, endorsed all Mr. Sheppard's remarks. The less said in calling attention to rare plants the better; it simply calls the attention of both vandals and collectors to the desirability in their own interests of collecting these plants for sale or other purposes. A true naturalist would never buy a rare specimen if there were the slightest chance of its extinction.

The discussion was at this point adjourned until the following subject had been brought forward by MR. R. H. WHITEHOUSE.
The Best Means of Preventing the Extinction of Local Species.

It is an easy matter to talk about what measures should be taken to prevent the extinction of species, but it is exceedingly difficult to find really practicable measures to enforce.

This subject has occupied the attention of the Belfast Naturalists' Field Club for many years; not so much for the necessity for active measures in their district, for we are singularly free from the wanton destruction reported from many districts, but more from the fact that they realise that it is better to have some workable scheme in readiness should necessity arise. Besides, the Club is anxious to do its part for the common good, and to support heartily schemes which will prove effective in preserving local species from destruction.

Discussion will be most profitable if we place ourselves in the position of the people who would be affected by any measures; we shall then be in a better position to realise the objection to schemes.

We must not forget there is a dominant characteristic of the British public which all reformers do well to consider, namely, the resentment to interference with what are thought to be personal liberties.

There are some causes for extinction over which, apparently, we have no control; I am thinking of 'progressive schemes' chiefly associated with the extension of towns. As a town expands (and here in Birmingham we know what that means) people penetrate further into the country for recreation. The chief occupation of our lower artisan classes during their country-rambles to-day is to make 'short cuts,' cut sticks from hedges with which to mow down any herb that is handy, remove ferns, saxifrages, &c., from walls and carry on other such acts of destruction. I cannot see any really practical means which can be adopted in this country against this evil; in Germany they would simply erect a prohibitory notice and nobody would go! And I might add that, as a lover of Nature, I strongly resented such notices even when in Germany. The average Britisher resents notices against trespassing, and I know naturalists who even make it a rule to invade all fields and woods which are forbidden.

The construction of public works is another frequent cause of destruction to objects of natural interest. The construction of huge reservoirs, as in the Lake District and Elan Valley, is fatal. Drainage-schemes similarly affect certain species. The construction of a railway is frequently attended with disasters, as we so frequently see in Sutton Park, where fires are common during hot weather, and are caused by hot cinders as often as by carelessness of the public.

What I want you to realise is that as naturalists we are of second-rate importance against such destruction. Many enthusiastic lovers of Nature talk as though rare animals and plants were of the first importance. This is a commendable enthusiasm, but it is sometimes a blind one. Areas *must* be drained; reservoirs *must* be made; railways *must* be constructed. When all is said and done, economic matters have, and always will have, greater weight than natural history matters. We must give way and mourn the loss of our valued friends.

I emphasise this side of the question because I know abler men than I will deal with preventable cases. But it seems to me that even here we need not be idle. Probably in the case of economic advances, the best means of preserving species liable to destruction would be some such method as the following: Our natural history societies should be provided with a complete list of the fauna and flora of their districts; they should make themselves acquainted with all schemes which involve the destruction of any species, and attempt to preserve them by such means as transplanting as nearly in the same district as possible.

In such discussions as these, it frequently happens that much time is spent in denouncing the actions of certain people in ruthless collecting; I am fully aware of such disgraceful vandalism, but at the same time I feel that we should be careful to see that we do not anger any class by hasty accusations. One person who is always accused is the teacher of nature-study with his class of pupils. To some teachers a plant has no interest unless it be rare in the locality; so one of the first things to try and bring home to all such teachers is that the commonest plants are of equal educational value to rare ones.

I have had some considerable experience of teachers of nature-study, and in spite of the accusations that have been made, I must put in a defence for them. Teachers are either well-informed naturalists or only superficially acquainted with animals and plants. In the former case, I have found that, being well acquainted with the rarer forms, they have been the very first to take special pains to preserve them from destruction; in fact, they are the people I look to for assistance in any reforms we may suggest. In the latter case, I know, we have unfortunate offenders, but there are many reasons why the damage done is not so great as many would have us believe. For example, such teachers seldom pass beyond the most frequented lanes, and very little precious stuff grows in such places; again, their very limited

knowledge restricts them to the commonest plants; no wide-awake teacher will invite difficulties by attracting the attention of his scholars to a plant he knows nothing about. Examine the collections of children, and you almost invariably find that they consist of common plants. Classes of children have been seen in Sutton Park, each child of which had a whole specimen of the butterwort, with the result that the area visited was quite cleared of this plant. This is an unfortunate instance only too true, but I venture to suggest it is not a common practice. It so happens that insectivorous plants have a great attraction for those who draw up school-curricula; we do not wish to prohibit instruction on these plants, but to do something to prevent their removal.

Another unwelcome character is the professional collector; where money is a consideration, the instinct to preserve rareties is liable to be suppressed. But where does the fault lie? Surely with the purchaser. Much as we might dislike acknowledging it, it is the places of higher learning that are primarily responsible. As university-teachers we require and buy these precious species, and so the professional collector makes his money and exterminates them. Yet I know collectors who are most careful not to remove such species entirely; probably also from the business point of view, for it is advisable to keep a supply! What is the remedy? Why should not the natural history societies take the matter up? If, as I have suggested, each natural history society provided itself with a list of the fauna and flora of its district, and undertook to supply material, the work might be transferred from the ruthless money-maker to interested societies; at any rate a sufficient check would be placed on supplies to prevent total extinction.

Of course the difficulties are great, and we must decide whether or not they are insurmountable. Naturalists are often bad business men, and from my experience I would say a professor would perhaps be surer of his stock from the

professional collector. Another thing, the professional collector is usually a member of the local natural history society, and a valuable member too. So the difficulties increase.

Let me touch on the view of those who advise education as the cure. I confess I do not see much hope there yet. In fact, if it is 'prevention of extinction with no risks' that is aimed at, no education at all would be the safest course.

It is a very high standard of education that is required to make a person appreciate the value of rareties in the animal and plant worlds. In our schools, it is better to omit instruction on uncommon forms; the commonest things in Nature are sufficient for a general education. It is the university—and college—student to whom we should appeal to respect rarer forms, and it may be worth while to make such an appeal; for rare creatures usually have only an academic interest.

The natural history societies should draw up the fauna and flora lists, and call the attention of headmasters and nature-study teachers to the desire to preserve certain species growing in the district; there need be no indication in the appeal as to where such plants grow.

Many societies already have such lists. Probably no place is more accurately worked than the North of Ireland, and it would not be a formidable task to single out examples for presentation to teachers of nature-study.

Much valuable assistance against ignorant destruction of rarer species might be obtained from the Press. Many of our 'dailies' give special columns to 'Nature,' and the rarer forms are objects for special description. If we make an appeal to the Press to emphasise the desirability of cultivating a pride in our local fauna and flora, such an appeal may be attended with success.

I see no other means of preventing the extinction of local species; it is a moral claim we have to make, and that is always the most difficult to establish.

My remarks have frequently tended to be in the direction of a plea for the defendant. I have taken this course deliberately in order that those who are prepared to present schemes for the prevention of destruction of local species may perhaps be in a better position (1) to realise the kind of opposition which offenders will raise against any measures which tend to limit a continuance of their practices, and (2) to form less hasty judgments on those who are considered offenders, traditionally, at any rate.

The CHAIRMAN, to show the position of affairs, read the following resolution from Section D, and the Council's motion on it:—

‘That the British Association for the Advancement of Science deplores the rapid destruction of flora and fauna throughout the world, and regards it as an urgent duty that immediate steps should be taken to secure the preservation of all species of animals and plants, irrespective of their economic or sporting value.’

The Council approved the principle of the above resolution, and resolved to give expression to it in the following terms:—

‘That the British Association for the Advancement of Science deplores the rapid destruction of fauna and flora throughout the world, and regards it as an urgent duty that steps should be taken, by the formation of suitably placed reserves or otherwise, to secure the preservation of examples of all species of animals and plants, irrespective of their economic or sporting value, except in cases where it has been clearly proved that the preservation of particular organisms, even in restricted numbers or places, is a menace to human welfare.’

SIR EDWARD BRABROOK (Balham and District Antiquarian and Natural History Society) said that this resolution of the Council embodied a resolution passed by the Conference of Delegates at Dundee and sent up to the Council.

Continuing the discussion on the two papers which had been read, Mr. W. MARK WEBB (Selborne Society) said that his society did not wish to deprecate or supersede the work of any other. The section devoted to plant protection only looked for help and co-operation in its undertakings. He thought that the power of the law should be definitely behind those who wished to preserve certain plants on their estates. He gave instances of extirmination and damage in a particular case. He also alluded to the good work which had been done by nature-study teachers by inculcating respect for living things, and agreed that common objects were better teaching material than rare ones, although there was much wilful destruction of common plants.

The REV. FREDERICK SMITH (Prehistoric Society of East Anglia) said, in criticising the 'utility' standpoint of Mr. Whitehouse, that so far from accepting such a position, the fact of the constant encroachment, owing to the exigencies of modern ways, upon the freedom of our native fauna and flora is the very reason why we, as students and lovers of Nature, should be more and more earnest and anxious for their defence and protection. We can do much toward helping to extend the areas of rarer plants by planting seed in likely places. This was a common practice of the speaker's friend, the late Dr. Buchanan White, of Perth. Some now very rare plants were once common in his Society's area; and now common species may become rare in their turn. There is something touching and wise in the Eastern view that it is a sin to destroy any life that only a God could give. It is assuredly a greater misdeed to allow, if it can be prevented, the annihilation of a single species of any kind of animal or plant.

Another delegate thought that Mr. Horwood's work was not on the right lines, and could not tolerate Mr. Webb's suggestion that landowners should be given power to prosecute for the taking of wild plants. He agreed with the resolution passed in Section K, that there should be no change in the law of trespass. He gave

instances of German regulations and methods of protection, which he considered inapplicable to Britain. The artificial dissemination of the seeds of wild plants, he thought, was against all work on their natural distribution.

MR. BRYAN CORCORAN (Croydon Natural History and Scientific Society), while against the idea of a new Act of Parliament for plant-protection, approved of much in Mr. Whitehouse's paper. He thought that Herbert Spencer said something to the effect that when an Act of Parliament was passed to protect any special section of the community that very section soon began to suffer. He believed that an Act as suggested would be very likely to aggravate the trouble it was passed to prevent. He asked if it would be possible to cultivate rare species away from their habitat, advertise them in the 'Selborne Magazine,' and make it worth while for dealers to sell them from these nurseries?

PROFESSOR J. H. PRIESTLEY (Leeds Naturalists' Club and Scientific Association) asked delegates to remember that the debate had shown that there was little agreement as to any line of action more extended than that covered by the previous resolution of the Council of the Association. That resolution recognised the urgency and importance of the problem, and recommended constructive proposals on the line of Nature reserves. This discussion made it clear that it was unwise without further consideration to press the matter upon the attention of the public with a view to legislative action. He therefore moved: 'That the previous question be now put.' This, having been seconded, was carried.

In consideration of the motion just passed, MR. JOSEPH WILSON asked leave to withdraw the amendment which stood in his name. This was agreed to.

The CHAIRMAN having read Mr. Horwood's resolution, SIR DANIEL MORRIS asked what was the present position, and was informed that there was no resolution to go before the General Committee.

The CHAIRMAN drew the attention of the Conference to fresh evidence which it was desired to gather regarding the working of the Wild Birds Protection Acts and the damage done by certain birds, such as the wild pigeon. It was suggested that evidence should be heard before a Departmental Committee. He proposed the following resolution: 'That it be referred to the Corresponding Societies Committee to arrange for evidence being given before the Committee which, it is understood, is about to be appointed by the Home Secretary to consider the amendment of the Wild Birds Protection Acts.'

This having been seconded by Mr. H. D. Acland, Mr. WEBB pointed out that if the Plumage Bill then before Parliament became law only ostrich feathers and eider down could be imported, and that the additional powers to be given to the Home Secretary might be intended to check the use of the plumage of native birds for commercial purposes.

The resolution, having been put to the meeting, was carried.

Mr. H. D. ACLAND moved the following resolution: 'That this Conference hears with regret that the work of the Royal Cornwall Polytechnic Society has been curtailed in consequence of the magnetic observatory of the Society coming to an end.'

He explained that the observatory at Falmouth had been discontinued in consequence of the establishment of the observatory at Eskdale Moor and the withdrawal of the grants from the Royal Society and the British Association. It was a misfortune that such highly scientific work as had been carried on continuously by this Society should be discontinued. It was important that the British Association should know that this Conference regrets the discontinuance of the work of one of its affiliated societies. To that end the resolution should be sent to the Council.

The REV. J. O. BEVAN seconded the resolution, which was then carried unanimously.

Catalogue of the more important Papers, especially those referring to Local Scientific Investigations, published by the Corresponding Societies during the year ending May 31, 1913.

* * * This Catalogue contains only the titles of papers published in the volumes or parts of the publications of the Corresponding Societies sent to the Secretary of the Committee in accordance with Rule 2.

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Portrait Gallery of the Royal Cornwall Polytechnic Society.

I. JOHN ST. AUBYN, FIRST BARON ST. LEVAN,
President, 1868 to 1870.

THE second President of the Royal Cornwall Polytechnic Society was, like his predecessor, one of the leading men of Cornwall during a long period of usefulness. He was born at Clowance on the 23rd of October, 1829, being the son of Edward St. Aubyn, who was created a baronet in 1866, and of Emma, daughter of General Knollys. He was educated at Eton and Trinity College, Cambridge, taking his degree in 1852. From 1858 to 1887 he represented the extreme western part of Cornwall in Parliament, though the name of his constituency was changed, for he was member for West Cornwall until 1885, and afterwards for the "St. Ives Division." At first he called himself a Liberal, but his Liberalism was not of a very advanced type, and when the adoption of Home Rule by Gladstone brought "Liberal Unionists" into existence, that was the party to which he attached himself during the very short remainder of his career in the House of Commons. He had succeeded to the baronetcy at the death of his father in 1872, and in 1887 was created Baron St. Levan.

As Mr. John St. Aubyn, M.P. for West Cornwall, the future Lord St. Levan was President of the Royal Cornwall Polytechnic Society from 1868 to 1870, having been elected in succession to Sir Charles Lemon, the first President, who had held the office from the foundation of the Society in 1833 until just before his death in the early part of 1868. In 1871 Mr. St. Aubyn was elected President of the Royal Institution of Cornwall, and held



JOHN TOWNSHEND ST. AUBYN,
2nd BARON ST. LEVAN.

President of the Royal Cornwall Polytechnic Society, 1913—1914.

the office till 1873. As Sir John St. Aubyn, Bart., still M.P. for the most western part of Cornwall, he was elected President of the Royal Geological Society of Cornwall in 1891 and 1892.

It is not very easy to say how it happened, for there is extraordinarily little record of any work of his, but certain it is that for many years it was quite impossible to carry through anything of importance in Cornwall without Sir John St. Aubyn being somehow not only mixed up in it, but generally directing it. He was essentially a man of affairs, and could invariably be trusted to say and do the right thing, neither too much nor too little, at the right moment. Moreover, everybody liked him, which had a good deal to do with it.

In 1856 he married Lady Elizabeth Clementina Townshend, daughter of the fourth Marquess Townshend. They had a very large family, and it was probably in consequence of the number of his children that Sir John St. Aubyn found it necessary to enlarge his house on St. Michael's Mount. The additions were carried out with remarkably good taste, and though in bulk they are equal to or even larger than the old buildings they have not in any way taken from the beauty of the whole. From the land about Marazion they are not visible, and from the sea or from the land to the south and east of the Mount they look very well. These new buildings were erected in 1875 to 1878.

After representing practically the same constituency in Parliament for nearly thirty years, Sir John St. Aubyn was raised to the peerage, taking his title from a parish in which he had a considerable amount of property. He was for twenty-one years a member of the House of Lords, and died in 1908, after a parliamentary career in the two Houses of just fifty years.

II. JOHN TOWNSHEND ST. AUBYN, SECOND BARON ST. LEVAN, *President*.

The present President of the Royal Cornwall Polytechnic Society was born at Ball's Park, Hertford, the seat of his

maternal grandfather, on the 23rd of September, 1857. He was the eldest son of Sir John St. Aubyn, Baronet, who in 1887 was created Baron St. Levan, and the Lady Elizabeth Clementina, daughter of the 4th Marquess Townshend. He was educated at Eton and Trinity College, Cambridge. He joined the Grenadier Guards in 1878, and served in the Egyptian and Soudan campaigns, being aide-de-camp to General Earle and to General Brackenbury, and at Suakim to Sir Redvers Buller. He was present at the battles of Teb, Tamai and Kirbeka, and received a medal, three clasps and the Egyptian Star, besides being twice mentioned in despatches. He was aide-de-camp to Sir William de Vœux, Governor of Hongkong from 1889 to 1890, and Military Secretary to Lord Stanley of Preston, Governor General of Canada, 1892-93. In 1890 he was promoted to be major for his services in the Soudan, and he commanded the Grenadier Guards from 1904 to 1908, having commanded the 3rd Battalion of the Regiment from 1903 to 1906. In 1905 he was made a Commander of the Royal Victorian Order, and in 1908 a Companion of the Bath. He also holds the Second Class of the Prussian Order of the Red Eagle. He succeeded his father in 1908. In 1892 he married the Lady Edith Hilaria Edgcumbe, third daughter of the fourth Earl of Mount Edgcumbe, and has two daughters. He was elected President of the Royal Cornwall Polytechnic Society on February 11th, 1913, having been a Vice-President from 1910 to 1912. He is also President of the Royal Geological Society of Cornwall, whose centenary occurs in 1914. He is County Commissioner for Boy Scouts in Cornwall.

III. CAROLINE FOX.

Caroline Fox was the second daughter of the late Robert Were Fox, F.R.S. and Maria his wife (née Maria Barclay of Bury Hill), and was born on the 24th May, 1819 at Falmouth, and died on the 12th January, 1871 at Penjerriek.

1842



CAROLINE FOX.

(From a drawing by Sir Hubert Herkomer).

She was one of the originators of the Royal Cornwall Polytechnic Society, and from its commencement showed a warm personal interest in its welfare. For many years she was a member of the General Committee and a frequent attender. As early as the first two Exhibitions, in 1833 and 1834 respectively, she obtained prizes. Matters connected with Art and Science appealed to her cultivated mind and several beautifully painted copies of the "Old Masters" were the outcome of her skilful hand and brush.

In the extracts from her Journals and Letters (1835 to 1871), edited by the late Horace N. Pym under the title "Memories of Old Friends," is a Memoir, which should be consulted for further information respecting her daily interests and associations and as to her character, "attracting, reflecting and assimilating from the stronger natures around her all that is noteworthy, high-toned and deep-souled. The bright gaiety of the high-spirited girl is rapidly succeeded by the philosophic mind belonging to greater knowledge, and maturer years." With her father and sister (the late Miss Anna Maria Fox), she frequently visited London, the British Association and kindred meetings, where they made friends with many persons of note, including John Stuart Mill, John Sterling, and his friend Dr. Calvert, Thomas Carlyle and his wife, F. D. Maurice, Sir John Herschel, Wordsworth, Amelia Opie, the Bunsen family, Prof. Owen, Sir Edward Sabine, Sir Fowell Buxton, William Edward Forster, Guizot and Derwent and Hartley Coleridge. At their Penjerriek home, from time to time, they entertained men of distinction, such as John Bright, Tennyson, Holman Hunt, Val Prinsep, etc."

Mrs. Rogers of Penrose, writing in 1845, to Miss Caroline E. Stephen (sister of the late Mr. Leslie Stephen), who in 1882 published for private circulation, "Caroline Fox and her Family," incidentally mentioned the subject of this Memorial, as follows:—"The next glimpse of the Fox family was at Penrose,

“when one day Mr. and Mrs. Robert Fox, their cousin Mrs. Robert Barclay of Blackwell, and Anna Maria arrived unexpectedly and lunched with us. Well do I remember their reception by my father and mother-in-law, and felt without any words that these were guests they “delighted to honour.” After luncheon we went for a walk, and Anna Maria was my companion. The rapidity of her thoughts and words gave me a vivid impression of her eagerness, and I could quite understand how her industry and suggestiveness might have started the Falmouth Polytechnic. She filled my thoughts for many a day, and I tried to find out all I could about her from my husband’s family, who had long known her; but the discussion would always end with “You must see Caroline,” who I had found had enchanted the County by a sparkle and humour they did not expect to find under the quiet Quaker garb.”

Finally allusion must be made to her active sympathies with the poor and the sick. Her visits to the Royal Cornwall Sailors’ Home, the Workhouse and the Prison (demolished last year), were among her frequent acts of charity, whilst all efforts and objects, that came under her notice, for the benefit and elevation of suffering humanity met with her cordial sympathy and practical support.



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Hon. Treasurer in Account with the Royal Cornwall Polytechnic Society.

DR.

1913.

CR.

	£	s.	d.
To Balance in Capital & Counties Bank	49	12	2
„ Donation, H. R. H. The Prince of Wales	5	0	0
„ Members Subscriptions			
for 1913	146	3	6
„ „ Arrears	8	5	0
	154	8	6
„ Rent of Hall, Light, etc.	261	16	6
„ Rent of Committee Rooms	46	6	0
„ Refunded for Light—G. S. King	5	7	10
„ Acknowledgment Rent	1	0	0
„ Interest on Deposit Accounts	13	5	3
„ Cornwall County Council, Grant			
towards Exhibition Expenses	24	16	0
„ Falmouth Hospital, towards painting	6	10	0
„ Sale of Reports	15	0	0
„ Admissions to Summer Meeting	1	14	0
„ Excursion Tickets	11	9	0
„ Outstanding Cheque	2	2	0
„ Due to Secretary (Petty Cash)	1	0	0
	3	2	0
	£584	3	3

	£	s.	d.
By Salaries	78	10	0
„ Hallkeeper's Wages	30	5	0
„ Gas, Electric Light, Coal, etc.	6	8	0
„ Rates, Taxes and Insurances	56	11	0
„ Travelling Expenses	15	10	2
„ Repairs and Renewals	21	6	1
„ Postages, Telegrams, Railway Carriage, etc.	18	8	8
„ Printing and Stationery,			
General	24	7	2
Annual Report	36	18	6
	61	5	8
„ Labour	5	9	9
„ Judge's Fees	4	12	10
„ Refreshments, Summer Meeting, etc.	15	5	10
„ Materials	34	9	6
„ Donation to Falmouth Hospital	6	10	0
„ Donation to Royal Institution of Cornwall	25	0	0
„ Library, New Books, and Bookbinding	10	9	11
„ „ Ordnance Maps	17	4	0
	27	13	11
„ Summer Meeting—			
Conveyances	14	0	8
„ „ Billposting	3	4	3
„ „ Medical Expenses	2	2	0
„ „ Donation towards			
Bicycle	2	17	6
	22	4	5
„ Acknowledgment Rents..	5	6	0
„ Winding Clock	1	0	0
„ Rent of Rooms, 2 years..	26	0	0
„ Cheque Books	10	0	0
„ Outstanding Cheques from 1912	51	16	2
„ Transferred to Deposit Account	65	19	1
„ Balance in Capital and Counties Bank	8	1	5
„ „ in Secretary's hands	1	0	0
	9	1	5
	£584	3	3

Assets— Balance in Capital and Counties Bank, Falmouth, on Current Account	£8	1	5
„ „ Secretary's hands	1	0	0
	9	1	5
„ „ on Deposit Account, No. 1—Miss Fox's Legacy	50	0	0
„ „ „ „ No. 2	480	0	0
	530	0	0
Liabilities—Nil.	£539	1	5

Examined with Vouchers and found correct,

R. BARCLAY FOX,) Audit Committee.
W. W. J. SHARPE,) 27th January, 1914.

Royal Cornwall Polytechnic Society.

DECLINATION OF THE MAGNETIC NEEDLE. (FALMOUTH).

This Table has been prepared by Mr. W. L. FOX, F.R.Met.Soc., Hon. Sec. of the Observatory Committee.

The following information has been obtained from the Magnetic Tables and Notes which have appeared annually in the reports of the Society. It is hoped that the information may be found useful in estimating the Westerly declination by those engaged in mine surveying and other kindred occupations throughout the County.

Mean Annual Values of the Magnetic Declination at the Observatory, Falmouth, for the 25 years, 1888 to 1912, inclusive.

Year	Declination.		Difference from previous year.
	°	'	'
1888	|| 19	35.2	
1889	|| 19	30.2	5.0
1890	|| 19	24.2	6.0
1891	* 19	18.3	5.9
1892	* 19	13.1	5.2
1893	* 19	6.5	6.6
1894	* 19	0.9	5.6
1895	* 18	54.5	6.4
1896	* 18	47.5	7.0
1897	* 18	42.2	5.3
1898	* 18	37.5	4.7
1899	* 18	32.7	4.8
1900	* 18	29.1	3.6
1901	* 18	25.5	3.6
1902	* 18	21.5	4.0
1903	* 18	18.3	3.2
1904	* 18	12.0	6.3
1905	* 18	8.4	3.6
1906	* 18	5.3	3.1
1907	* 18	0.4	4.9
1908	* 17	54.7	5.7
1909	* 17	48.4	6.3
1910	* 17	41.6	6.8
1911	* 17	33.0	8.6
1912	* 17	24.2	8.8

|| Mean of absolute observations.

* Mean of tabulated hourly values on "quiet" days.

It will be noticed that the Magnetic Declination in 1888 was 19 degs. 35.2 mins. W., and in 1912 it was 17 deg. 24.2 mins. W., being a difference in 25 years of 2 degs. 11.0 mins. W., or an average annual declination during 25 years of 5.2 mins. W. There is an annual decrease of declination but the amount of the variation is irregular, ranging during the above named period between a maximum difference in 1912, of 8.8 mins. and a minimum of 3.1 mins. in 1906.

FALMOUTH OBSERVATORY.

METEOROLOGICAL
AND
MAGNETICAL TABLES
AND
REPORTS

FOR THE YEAR 1911,

AND

TABLES OF SEA TEMPERATURE, WITH NOTES,

BY

WILSON LLOYD FOX, F.R. Met. Soc.

(Hon. Sec. Observatory Committee),

AND

EDWARD KITTO, F.R. Met. Soc.

(Superintendent Falmouth Observatory).

FALMOUTH :

J. H. LAKE AND CO., PRINTERS, MARKET STRAND.

1912.

REPORT
OF THE
OBSERVATORY COMMITTEE
OF THE
Royal Cornwall Polytechnic Society
FOR THE YEAR 1911.

COMMITTEE :—

Mr. H. DYKE ACLAND, F.G.S.	Major LUARD, R.E.
Mr. J. DAVIES ENYS, F.G.S.	Capt. ARTHUR ROGERS, R.N.R.
Mr. HOWARD FOX, F.G.S.	Mr. WALTER ROGERS, B.A.
Mr. ROBERT FOX.	Mr. WILSON LLOYD FOX, J.P.
	<i>F.R. Met. Soc., Hon. Sec.</i>

METEOROLOGICAL.

The self-recording instruments at the Falmouth Observatory have continued to record with precision the hourly values of the meteorological elements throughout the year 1911. The instructions of the Meteorological Office have been strictly carried out, and all necessary measures taken for the proper and efficient working of the Observatory.

The results, including Barometric Pressure, Dry Bulb Temperature, Humidity, Wind Direction and Force, Rainfall and Bright Sunshine, are published by the Meteorological Office monthly, and also in a yearly volume entitled "The British Meteorological Year Book."

The annual maintenance grant of £250 has been received from the Meteorological Office as usual.

The accounts have been kept by Mr. W. W. J. Sharpe, the treasurer, and audited by Messrs. H. D. Acland and Harold B. Carlyon.

The Observatory was inspected by Mr. Ernest Gold, M.A., of the Meteorological Office, from the 13th to the 18th of July.

The Climatological Observations have been taken with care and regularity. The instruments employed for this work are set up and the observations made in accordance with the rules of the Royal Meteorological Society. The results have been forwarded each month to that Society and published by them, with the observations from their other stations in "The Meteorological Record."

Captain W. White, of the tug "Perran," has continued the series of Sea Temperature Observations. Tables and notes prepared by your honorary secretary will be published in your Annual Report, together with the usual meteorological tables, compiled by Mr. Edward Kitto, the Superintendent.

Dr. H. R. Mill, Editor of "British Rainfall," has been supplied with particulars of the rainfall at Falmouth monthly during 1911, and at various other places in Cornwall and Devon, for insertion in his rainfall publication for Great Britain.

The Press has been regularly furnished with meteorological data, and several public institutions and private individuals have been supplied with information.

MAGNETICAL.

The Magnetical Department has been efficiently maintained, and the self-recording instruments have worked satisfactorily, save for a drift in the Bifilar. A new suspension of this magnet was made on the 15th July by Mr. Ernest Gold, M.A., of the Meteorological Office.

A report on the work of Falmouth Magnetic Observatory, drawn up by Dr. W. N. Shaw, F.R.S., on behalf of the Grant Administration Committee, was submitted to the meeting of the British Association at Portsmouth in September last.

In response thereto the British Association made a grant of £25.

In June a sum of £70 was received from the Royal Society towards the maintenance of the magnetic observations for 1910-11.

The Committee desire to express their appreciation of the recognition thus shown of the value of the work done at the Falmouth Observatory.

Tables of diurnal inequality of magnetic declination, inclination, and of horizontal and vertical force at Falmouth for 1911, derived from hourly tabulations of the photographic curves, and prepared by Mr. Kitto, will be published in your Annual Report. These are substituted for the hourly values of magnetic declination, inclination, and force hitherto published, so as to be in conformity with the data published by other British Magnetic Observatories.

The Committee and Superintendent are again indebted to Dr. Charles Chree, F.R.S., of Kew Observatory, for valuable assistance.

Particulars of the daily magnetic condition as regards disturbance according to a prescribed scale have, at the request of the International Conference on Terrestrial Magnetism, been sent quarterly to Dr. E. Van Everdingen, Director-in-Chief, Royal Meteorological Institute, De Bilt, Holland, for publication with similar data from other magnetic observatories.

Information as to magnetic declination has been furnished to the Heriott-Watt College, Edinburgh; other requests for information have also been complied with.

The year, on the whole, has been free from magnetic disturbances of exceptional magnitude.

A phenomenon of peculiar interest was recorded on the 29th May, when between two and three p.m. a sudden magnetic disturbance took place very similar to the outbreak of a storm, which lasted for twenty-five minutes yet without further continuation. This phenomenon was also recorded at the Potsdam Observatory, and the Director, Dr. A. Schmidt,

was, at his request, furnished with particulars as to the time of occurrence at Falmouth, with measurements of the ordinates, the scale values, and tracings of the magnetic curves.

Many valuable publications from both British and Foreign Institutions have been presented to the Observatory Library during the year, including an important work entitled "Forecasting Weather," by Dr. W. N. Shaw, F.R.S., Director of the Meteorological Office, and a volume of Meteorological Observations made at the Radcliffe Observatory, Oxford, from 1900 to 1905 (just published), presented through Mr. H. D. Acland, F.G.S.

The Climate and Meteorology of Falmouth.

The year 1911 has furnished so many instances of remarkable meteorological phenomena that a few notes on some of the more prominent may be of interest.

Atmospheric Pressure.—The mean 30·022 is ·042 above the average and has been exceeded on four occasions only during the last 40 years, viz.: in 1887 with 30·052, in 1896 with 30·064 in 1905 with 30·030, and in 1908 with 30·047. As an example of the relation between pressure and rainfall it may be mentioned that during these years respectively the rainfall was on an average 11 inches below the mean. The maximum 30·84 occurred on the 18th of January. This is ·257 below the previous highest of 31·097 on the 28th of January, 1905. There have been four other higher readings, three of which were recorded in the month of January and the other one in February. Taking the annual maximum pressure of the last 41 years January claims 17 instances, and of the other months February comes next with 9, December with 7, March and May with 3 and 2 respectively, and April, October and November with 1 each. The minimum is distributed over the 12 months in a different proportion, viz.: December has 10, November 9, January 8, February 6, October 3, March and April 2 each, and September 1.

Bright Sunshine.—The number of hours was 2055·5, being 283 in excess of the mean. The only previous years, during the last 30, in which there have been more than 2000 are 1887 (Jubilee) 2074; 1893 with the record of 2088; and 1899 with 2028. There were 345·7 hours in July, which is the greatest number during that or any previous month since 1881; the next was 294·6 in 1899; November had 102·9 which has only once been exceeded, viz.: in 1909 with 115·3. Although December was a very wet month the bright sunshine 69·3 was 14·5 hours above the average. There were 309 sunny days as against the record of 323 in 1887 (Jubilee) and 4 above the mean of the last 30 years.

Table of Bright Sunshine at Falmouth for the Year 1911.

1911.	Number of hours of Bright Sunshine.	Greatest amount in one day.	Number of days on which Bright Sunshine occurred.	Percentage of Possible Duration.	Mean number of hours of Bright Sunshine for 30 years, 1881—1910.	Mean number of days on which Bright Sunshine occurred in 30 years, 1881—1910.
January ..	74·1	7·4	22	28	58·2	20
February ..	72·4	8·4	19	26	85·4	21
March.....	113·9	10·7	23	31	141·1	27
April	185·0	12·1	28	45	184·3	27
May	277·6	14·3	28	59	232·1	29
June	252·4	14·6	30	52	225·5	28
July	345·7	15·2	31	71	223·9	29
August	252·1	14·0	31	57	213·8	30
September..	200·0	12·7	29	54	162·8	27
October	109·9	9·4	24	34	115·6	26
November ..	102·9	8·0	22	39	74·8	22
December ..	69·3	6·6	22	29	54·8	19
Sums	2055·5	133·4	309	525	1772·3	305
Means	171·3	11·1	26	44	147·7	25·4

The records are from the Campbell-Stokes Bright Sunshine Recorder, the property of the Meteorological Office.

CLIMATOLOGICAL STATION.

OBSERVATIONS taken at the FALMOUTH OBSERVATORY during 1911.
Height above mean sea level, 167 feet.

1911.	Means at 9 a.m. (local time.)			TEMPERATURE.						Cloud, 0-10.	RAIN.	
				MEANS.			EXTREMES.				Amnt.	No. of days.
	Dry.	Wet.	Hy.	Max.	Min.	Rnge.	Max.	Min.	Rnge.			
	°	°	°/°	°	°	°	°	°	°		In.	
Jan. . . .	42·3	41·1	90	46·2	38·4	7·8	50·8	30·0	20·8	7·4	1·66	11
Feb. . . .	43·9	42·0	85	47·9	40·1	7·8	54·8	29·7	25·1	7·4	3·31	16
March. . .	44·5	42·2	82	48·2	39·9	8·3	55·0	33·4	21·6	7·1	3·86	21
April.. . .	48·0	45·0	79	52·0	40·9	11·1	59·3	28·0	31·9	5·6	2·81	13
May	57·9	53·5	74	62·3	49·0	13·3	73·4	42·8	30·6	3·5	1·04	5
June	61·3	56·3	70	65·3	53·1	12·2	76·9	46·2	30·7	4·9	2·46	13
July	67·2	61·1	68	72·3	58·4	13·9	81·5	51·3	30·2	3·8	1·14	4
Aug.	66·7	62·3	76	71·1	59·2	11·9	77·6	51·1	26·5	4·9	2·45	9
Sept. . . .	61·6	57·7	77	66·3	53·7	12·6	78·1	56·2	21·9	5·2	3·33	15
Oct.	53·6	51·2	83	57·5	49·4	8·1	62·6	38·5	24·1	6·5	4·21	22
Nov.	46·5	44·3	84	50·4	41·9	8·5	56·9	30·0	26·9	6·3	5·05	22
Dec.	47·4	46·1	90	51·1	43·6	7·5	53·3	36·1	17·2	6·0	9·19	27
Means. . .	53·4	50·2	80	57·6	47·3	10·3			25·6	5·7	40·51 3·38	178 15

The above table is a summary of the observations which have been furnished every month to the Royal Meteorological Society, and published in their *Meteorological Record*. They are taken from thermometers, divided on the stem and verified, placed in a Stevenson screen, with an excellent exposure, at a height of 4 feet over grass, and of 167 feet above mean sea level. The rainfall is from the 8-inch copper rain gauge, two feet high, the property of the Meteorological Office. The rainfall is taken at 10.30 a.m., and with the maximum temperature is entered to the previous day.

The following notes are based upon the foregoing table and those of a similar character which have preceded it in the annual reports of the Royal Cornwall Polytechnic Society since 1882.

Temperature.—The mean for the year was $53^{\circ}4$, or $1^{\circ}5$ above the average of the previous 29 years. The mean temperature of January, March, April and November was below the average of those respective months, whilst that of the remaining months was above. July, with a mean temperature of $67^{\circ}2$, was the warmest month. This is a record for that month. The nearest approach to it is $65^{\circ}8$ in 1887 (Jubilee). The mean temperature of August was $66^{\circ}7$, and of September, $61^{\circ}6$, which have only been exceeded in 1899 with $67^{\circ}1$, and in 1895 with $63^{\circ}1$ respectively. The range of temperature for the year was $53^{\circ}5$. This contrasts with 86° in the Midland counties, 81° in the East, and 80° in the S.E. of England, and demonstrates afresh the equable climate of the S.W. of England. The extreme maximum of $81^{\circ}5$ occurred on the 14th of July, and is the highest recorded temperature for that month since 1885, when $82^{\circ}5$ was registered. The next highest reading in 1911 was $78^{\circ}1$ on the 5th of September, which is a record, and compares with the next highest of $76^{\circ}7$ in 1906. In May the maximum rose to $73^{\circ}4$, which is 1° higher than any previous reading for that month at Falmouth. August had a maximum of $77^{\circ}6$, which has only once been exceeded, when 80° were registered in 1909. These maxima are in striking contrast to the very high temperatures of some other districts of England, especially those of the South and East, where shade temperatures of over 90° were recorded during July and August, and in the latter month rose to 98° , and at Greenwich to 100° on the 9th, which is reported to be the highest ever recorded in the British Isles. They should effectually correct the popular fallacy that the South coast of Cornwall is hot in summer.

The year was also remarkable for the high minimum temperatures, e.g. 30° in January, $33^{\circ}4$ in March, $42^{\circ}8$ in May (only once higher with $43^{\circ}1$ in 1908), $51^{\circ}3$ in July (once

previously higher in 1893 by $0\cdot3$), $51\cdot1$ in August, $56\cdot2$ in September, a record (being $8\cdot2$ in excess of the previous highest), and $36\cdot1$ in December (only once exceeded by $37\cdot1$ in 1900). The minimum of 28° on the 6th April was the lowest for the year, and is the lowest recorded for that month, the nearest approach being 29° in 1888. This occurred during "one of the sharpest touches of cold ever experienced in mid-spring"— 10° of frost were registered in various districts, and considerably lower temperatures than this in some central places and in the north. It will be seen that the above data are not in accord with statements which have been published to the following effect: (1) "That during 1911 the minimum temperatures were below 20° over the entire kingdom except in the Channel Islands." (2) "The absolutely greatest duration of sunshine was 2,028 hours in the Channel Islands" whereas at Falmouth there were 2,055·5. This demonstrates what misstatements obtain currency when generalisations are made without studying the marked meteorological variations which occur in different districts.

Humidity.—The mean was 80% as compared with $82\cdot4$ for the last 29 years. Although the rainfall in January was unusually small ($1\cdot66$ inches) on 11 days the humidity was 90 which has been exceeded with 91 in both 1904 (rainfall $6\cdot2$ inches) and in 1906 (rainfall $6\cdot9$ inches). June experienced a humidity of 70 which with two exceptions, 68 in 1893 and 1895 respectively, is the lowest for that month. In July the mean was 68 (a record). At 9 a.m. of the 13th the relative humidity was only 35, there being a difference of $17\cdot8$ between the reading of the dry and wet bulb thermometers. This is the driest air experienced at Falmouth since 1868, when the Observatory was started. The mean in August was 76, as against an average of 79, and in September 77, which is the lowest but two, viz., 76 in 1893 and 74 in 1899 respectively.

Rainfall.—The total was $40\cdot51$ inches, which is $1\cdot7$ below the average of the last 29 years. Of this total $15\cdot14$ inches fell during the first 6 months and $25\cdot37$ during the last. Of the latter amount $14\cdot24$ fell during November ($5\cdot05$) and

December (9·19). The months of January, February, March, May, July, August and October had less rain than the mean whilst the other months had more. May was the driest month of the year with 1·04 inches. January and July came next with 1·66 and 1·14 respectively. The least amount of rain during any one month since 1882 was 0·02 in May, 1896. There were three instances of absolute drought, namely:—From May 4th to June 14th, a period of 42 days, during which time only ·06 inch of rain fell between 9 and 11 p.m. of the 29th of May, when a slight thunderstorm passed over the locality. Again in July no rain fell for 28 days 9 hours. A slight shower amounting to ·01 fell at 8 p.m. on the 28th, and on the 29th a thunderstorm of a peculiar character was experienced. At 2.30 p.m. the wind suddenly rose from dead calm to 61 miles falling again to almost calm in 40 minutes. A further dry period occurred in August and lasted for 18 days, from the 7th to the 23rd, during which time only ·03 inch of rain fell on the 12th. These dry periods in three successive months are unique in the annals of local rainfall.

Here it may be noted that the most remarkable drought ever recorded at the Falmouth Observatory was that of 1893. It may be said to have lasted for 78 days, extending from March 2nd to May 18th, during which period not so much as one tenth of an inch fell on any single day and out of which number 64 days were absolutely rainless.

The year 1887 is also worthy of mention in this respect, when the rainfall for each month was far below the average. The extreme limit was reached in June when ·05 inch only was recorded, and this on three days, and was the result of thick wetting fog rather than rain. Thirty-two consecutive days were perfectly dry, and, setting aside the small amount of moisture above mentioned, the drought lasted for thirty-nine days.

The amount of rain in December (9·19 inches) has been exceeded on three occasions. In some other localities it was very excessive, e.g., 18 inches at Shepstor, Devon (total for

year, 65·91), 23·94 inches at Princetown, Devon (total for year, 88·33). A fall of over 13 inches in December was frequent in the same county. The number of rainy days was 178, being 21 less than the average of the last 29 years. January, with 11, was 9 below the mean; February, with 16, was the same as the mean; April, with 13, was 2 below; May, with 5, was 8 below; July, with 4 (a record) was 10 below; August, with 9, was 7 below; whilst the other months were above, including December, with 27, or 5 above.

TABLE SHOWING THE TEMPERATURE OF THE SEA OFF FALMOUTH DURING 1911

from observations taken by Captain White, of the steam tug "Perran," about one mile outside Falmouth Harbour, with the differences from the Air Temperatures taken from the Thermograph at the Falmouth Observatory.

1911.	Number of Daily Observations.	Means.	Difference from Air.	Absolute Maximum.	Difference from Air.	Absolute Minimum.	Difference from Air.	Monthly Range.	Difference from Air.	Means for 31 years, 1872 to 1885 and 1894 to 1910.
		°	°	°	°	°	°	°	°	°
January	16	47·0	+4·4	48·0	-3·1	46·0	+14·4	2·0	-17·5	48·2
February	13	46·0	+1·6	47·0	-7·4	45·0	+13·5	2·0	-20·9	47·1
March ..	11	47·3	+3·3	48·0	-6·9	46·5	+11·9	1·5	-18·8	47·3
April	13	47·2	+1·0	48·5	-9·0	46·0	+17·2	2·5	-26·2	48·8
May	18	53·1	-2·0	56·5	-14·6	49·0	+5·3	7·5	-19·9	51·9
June	18	57·1	-1·5	61·0	-13·2	53·5	+6·4	7·5	-19·6	55·5
July	19	61·2	-3·1	64·0	-14·1	54·0	+2·0	10·0	-16·1	58·2
August ..	23	63·2	-1·0	66·5	-7·9	61·0	+9·6	5·5	-17·5	59·7
September	21	61·8	+2·6	66·0	-7·9	58·0	+13·0	8·0	-20·9	58·0
October	12	57·1	+4·2	58·5	-3·2	55·5	+16·5	3·0	-19·7	56·9
November	11	52·5	+6·1	54·5	-2·7	50·5	+18·5	4·0	-21·2	53·5
December	7	49·1	+1·2	49·5	-4·2	48·5	+12·1	1·0	-16·3	50·3
Means ..	15	53·5	+1·4		-7·8		+11·7	4·5	-19·5	53·0

Additional Sea Temperatures taken during 1911.

1911.	Place of Observation.	Temperature.	1911.	Place of Observation.	Temperature.
		°			°
January 2	Moorings ..	47.5	June 6	Centre of Harbour ..	56.0
" 3	Centre of Harbour ..	47.0	" 14	Ditto ..	61.0
" 12	Moorings ..	46.0	" 15	Ditto ..	60.5
" 13	Centre of Harbour ..	46.0	" 19	Ditto ..	61.0
" 16, 25	Ditto ..	46.5	" 24	Moorings ..	58.0
" 26	Ditto ..	46.0	" 30	Ditto ..	55.0
" 28	Ditto ..	47.0	July 4, 5	Centre of Harbour ..	58.0
" 30	Ditto ..	46.5	" 6	Moorings ..	60.0
" 31	Ditto ..	45.5	" 7	Ditto ..	61.0
February 1	Ditto ..	45.5	" 10	Ditto ..	62.0
" 6	Moorings ..	43.5	" 29	Centre of Harbour ..	61.0
" 7	Centre of Harbour ..	43.5	" 31	Moorings ..	63.0
" 8	Ditto ..	44.0	August 1	Ditto ..	63.5
" 11	Ditto ..	43.5	" 10	Centre of Harbour ..	61.0
" 18	Moorings ..	45.5	" 11	Ditto ..	62.0
" 20	Centre of Harbour ..	47.5	" 22	Ditto ..	65.0
" 22	Ditto ..	47.0	Sept. 1, 12	Ditto ..	63.5
" 23	Ditto ..	47.5	" 26, 27	Ditto ..	59.0
" 24	Ditto ..	48.0	" 30	Moorings ..	58.5
" 25	Ditto ..	47.5	October 3	Ditto ..	58.0
March 6	Far Bay ..	48.0	" 4	Centre of Harbour ..	57.0
" 8, 9, 10	Centre of Harbour ..	46.5	" 5, 6	Ditto ..	56.5
" 11	Moorings ..	46.0	" 7	Ditto ..	56.0
" 16	Ditto ..	45.5	" 9	Ditto ..	56.5
" 18	Ditto ..	45.0	" 10, 11	Ditto ..	56.0
" 20	Centre of Harbour ..	46.0	" 14, 16	Ditto ..	56.5
" 21	Moorings ..	45.5	" 27	Ditto ..	55.0
" 22	Centre of Harbour ..	47.0	" 28	Moorings ..	54.5
" 23	Ditto ..	47.5	" 30, 31	Centre of Harbour ..	55.0
" 24, 25	Ditto ..	47.0	Nov. 1, 3	Ditto ..	55.0
" 27, 28	Ditto ..	46.0	" 8	Ditto ..	52.5
" 29	Ditto ..	45.5	" 9	Ditto ..	52.0
" 30	Ditto ..	45.0	" 10	Ditto ..	51.5
April 3	Ditto ..	47.0	" 11	Moorings ..	50.0
" 4	Ditto ..	46.5	" 17, 18	Centre of Harbour ..	51.5
" 5	Moorings ..	45.0	" 20	Ditto ..	51.0
" 6, 7, 8, 10, 11	Centre of Harbour ..	45.5	" 22	Ditto ..	50.0
" 18	Ditto ..	46.5	" 23, 24	Ditto ..	49.0
" 24	Ditto ..	47.5	" 25	Ditto ..	49.5
" 25	Ditto ..	48.0	" 29	Ditto ..	48.5
" 26	Ditto ..	48.5	" 30	Ditto ..	49.0
May 8	Moorings ..	53.0	December 1	Ditto ..	49.0
" 9	Ditto ..	54.0	" 2.5	Ditto ..	48.5
" 10, 11	Ditto ..	55.0	" 6, 7, 8	Ditto ..	48.0
" 12	Ditto ..	54.5	" 9, 13, 14, 15	Ditto ..	47.5
" 13	Ditto ..	54.0	" 21, 22	Ditto ..	48.5
" 24	Centre of Harbour ..	55.5	" 23	Ditto ..	49.0
" 26, 27	Ditto ..	56.0	" 25, 26	Ditto ..	48.5
June 1	5 miles S. of Harbour	57.0	" 27, 28, 29, 30	Ditto ..	49.0
" 3	Moorings ..	58.0			

FALMOUTH OBSERVATORY. LATITUDE 50° 9' 0" N.; LONGITUDE 5° 4' 35" W.

Height above mean sea level, 167 feet.

DATE.	PRESSURE OF AIR.										TEMPERATURE OF AIR.								
	Mean pressure of the Air.	Mean of daily Maxima.	Mean of daily Minima.	Mean daily range.	Absolute Maximum.	Date of Maximum.	Absolute Minimum.	Date of Minimum.	Monthly range.	Mean elastic force of Vapour.	Mean Temperature.	Mean of daily Maxima.	Mean of daily Minima.	Mean daily range.	Absolute Maximum.	Date of Maximum.	Absolute Minimum.	Date of Minimum.	Monthly range.
January	30.361	30.513	30.269	.256	30.840	18	29.569	11	1.271	.226	42.6	45.7	38.9	6.8	51.1	9	31.6	4	19.5
February	30.256	30.376	30.144	.232	30.753	2	29.468	23	1.271	.236	41.4	47.5	40.6	6.9	51.4	25	31.5	3	22.9
March	29.957	30.040	29.816	.224	30.566	2	29.296	12	1.270	.236	44.0	47.7	40.1	7.6	51.9	2	34.6	26	20.3
April.. .. .	30.053	30.166	29.933	.233	30.475	21	29.166	1	1.309	.247	46.2	51.5	41.1	10.4	57.5	11	28.8	6	28.7
May	30.007	30.070	29.961	.119	30.331	6	29.622	14	0.709	.318	55.1	61.1	49.2	11.9	71.1	29	43.7	2	27.4
June	30.023	30.111	29.939	.172	30.421	28	29.445	18	0.976	.388	58.6	64.1	53.1	11.0	74.2	6	47.1	14	27.1
July	30.170	30.228	30.112	.116	30.530	4	29.721	29	0.809	.444	64.3	70.9	58.3	12.6	78.1	14	52.0	2	26.1
August	30.002	30.067	29.939	.128	30.319	30	29.533	21	0.786	.491	64.2	69.9	58.9	11.0	74.4	14	51.4	31	23.0
September	30.084	30.168	30.001	.167	30.410	17	29.455	21	0.985	.406	59.2	64.5	53.8	10.7	73.9	8	45.0	21	28.9
October	29.885	30.018	29.776	.242	30.472	10	28.954	22	1.518	.334	52.9	56.5	49.1	7.4	61.7	19	39.0	29	22.7
November	29.765	29.883	29.636	.247	30.357	29	28.901	18	1.456	.253	46.4	50.1	41.7	8.4	57.2	5	32.0	27	25.2
December	29.723	29.896	29.510	.386	30.491	31	28.846	13	1.645	.285	47.9	51.1	44.2	6.9	53.7	2	36.4	6	17.3
Means	30.022	30.128	29.918	.210					1.168		52.1	56.7	47.4	9.3					24.1

The readings of the Barometer have been reduced to 32° Fahrenheit at mean sea level, and corrected for index error and capillarity. The results given in the Table have been deduced from the daily mean of the twenty-four (1 a.m. to midnight) hourly measurements of the continuous photographic curves of the self-recording instruments, the property of the Meteorological Office.

FALMOUTH OBSERVATORY. LATITUDE 53° 9' 0" N.; LONGITUDE 5° 4' 35" W.
Height above mean sea level, 167 feet.

DATE.	WIND.						HYGROMETRIC CONDITION.					RAIN.						
	Relative proportion of				Mean velocity in miles per hour.	Maximum velocity during one hour.	Date and hour of Maximum velocity.	Direction of Maximum velocity.	Mean pressure in lbs. per sq. foot.	Maximum pressure in lbs. per sq. foot.	Mean temperature of evaporation.	Mean temperature of Dew Point.	Mean difference between dew point & air.	Mean Humidity, computed at saturation=100.	Rain in inches.	Mean for 40 years, 1871-1910.	No. of rainy days.	Mean No. of rainy days for 40 years, 1871-1910.
1911.	N	E	S	W	miles	miles			lbs.	lbs.	°	°	°	°	in.	in.		
January	8	5	9	9	10.3	43	12th, 5 a.m.	N by W	0.53	9.24	40.4	37.7	4.9	83	1.67	4.55	11	20
February	6	4	8	10	15.4	41	23rd, 2 p.m.	WSW	1.19	8.40	41.8	38.8	5.6	81	3.31	3.67	13	17
March	9	8	6	8	13.4	31	16th, 1 p.m.	SSW	0.90	5.78	41.6	38.8	5.2	82	3.88	3.33	22	17
April	8	6	7	9	14.7	38	19th, 1, 2 p.m.	SW by S	1.08	7.22	43.3	40.0	6.2	78	2.82	2.83	13	16
May	6	9	9	7	9.3	39	3rd, 3 p.m.	SSW	0.43	7.60	52.0	49.0	6.1	80	1.07	2.26	4	13
June	6	6	7	11	11.0	28	22nd, 10 a.m.	SW by S	0.60	3.92	55.1	52.0	6.6	79	2.47	2.40	14	14
July	8	6	7	10	8.5	23	30th, 11 a.m.	SW by S	0.36	3.92	59.6	55.7	8.6	73	1.06	3.03	4	16
August	6	5	10	10	8.7	33	6th, 11 a.m.	SW	0.38	5.41	61.1	58.5	5.7	81	2.52	3.39	11	17
September	10	5	6	9	8.6	32	30th, 1 p.m.	N	0.37	5.12	56.0	53.2	6.0	81	3.34	3.46	14	16
October	6	9	8	8	12.8	41	30th, noon.	SSW	0.81	8.40	50.4	47.9	5.0	82	4.21	5.27	22	21
November	7	3	9	11	15.2	40	4th, 10, 11 p.m. 5th, 1 a.m.	SW by S	1.16	8.00	43.7	40.6	5.8	80	4.97	5.19	24	19
December	1	0	14	16	17.4	41	10th, 9 p.m.	W by W	1.51	9.68	45.9	43.7	4.2	85	9.18	5.81	29	22
Means	81	66	100	118	12.1				0.78		49.2	46.3	5.8	80	40.50	46.09	15	17

The direction and velocity of the wind are obtained from the continuous curves of the self-recording Robinson Anemometer the cups of which are 43 feet above the ground. The mean temperature of Evaporation is deduced from the continuous photographic curves of the wet bulb Thermograph. The rainfall is from the 11 inch self-recording Beckley Gauge 2 feet above ground. The number of Rainy Days are those on which 0.01 inch or more of rain was recorded. Wind, temperature of Evaporation, and Rainfall values are derived from the daily records 1 a.m. to midnight. The instruments are the property of the Meteorological Office.

MAGNETICAL OBSERVATIONS

FOR THE YEAR 1911,

Made at Falmouth Observatory, Latitude $50^{\circ} 9' 0''$ N. ; and Longitude $5^{\circ} 4' 35''$ W. Height, 167 feet above mean sea level.

Photographic curves of Magnetic Declination and of Horizontal and Vertical Force variations have been regularly taken during the year.

The scale values of the Instruments were determined on the 30th December, 1910. The following values of the ordinates of the photographic curves were then found :—

Declination, 1 cm. = $0^{\circ} 11' \cdot 7$

Bifilar, 1 cm. δ H. = 0·00056

Balance, 1 cm. δ V. = 0·00050

Deflections of the bifilar and vertical force magnets were also made on the 15th July, 1911, when the scale values were found to be :—

Bifilar, 1 cm. δ H. = 0·00057

Balance, 1 cm. δ V. = 0·00051

Deflections of the Bifilar were made on the 7th August, the result being :—

1 cm. δ H. = 0·00050

On August 24th the suspension was opened out to counter-act drift in the magnet; subsequent deflections gave :—

1 cm. δ H. = 0·00081

The principal magnetic disturbances recorded took place on the following dates :—

January 24 ; February 21, 22 ; March 20, 21 ; April 9 ;
October 10, 11 ; December 11.

Observations with the absolute instruments have been made about four times a month, of which the following is a summary :—

Determinations of Horizontal Intensity, 46
Determinations of Inclination, 46
Determinations of Declination, 46

The mean values of the Magnètic Elements for the year 1911 are as follows :—

Declination, $17^{\circ} 33' \cdot 0$ W.; Horizontal Force, 0.18798 C.G.S.; Vertical Force, 0.43172 C.G.S.; Inclination, $66^{\circ} 28' \cdot 2$ N.

The results in the following Tables, Nos. I, II, III, IV, are deduced from the magnetograph curves. The values in Table V. are also derived from the curves standardized by the absolute observations. These were made with the collimator magnet 66A and the mirror magnet 66C in the Unifilar Magnetometer No. 66, by Elliott Brothers, of London, and with the Inclinator No. 86, by Dover, of Charlton, Kent, employing needles 1 and 2, which are $3\frac{1}{2}$ inches in length.

The effects of temperature on the horizontal force curves are very small and are negligible, but a temperature correction has been determined and applied to the vertical force curves.

The time given is Greenwich Mean Time, which is 20 minutes 18 seconds earlier than local time.

The results are derived from the “quiet” days selected by International agreement at De Bilt, as below:—

January ...	7, 12, 17, 20, 21	July ...	...13, 14, 15, 16, 26
February ...	11, 12, 15, 19, 20	August ...	7, 8, 10, 11, 29
March ...	10, 11, 12, 17, 18	September...	2, 3, 14, 15, 26
April ...	5, 13, 14, 15, 26	October ...	1, 5, 15, 23, 28
May ...	1, 4, 13, 22, 24	November ...	1, 7, 22, 23, 24
June ...	3, 17, 18, 19, 25	December ...	2, 9, 21, 22, 23

In the Tables the seasonal means are grouped as follows:—

Winter:—January, February, November, December.

Equinox:—March, April, September, October.

Summer:—May, June, July, August.

The results are printed in the Royal Cornwall Polytechnic Society's Annual Report, and in the Annual Publication of the Meteorological Office.

The whole of the instruments have been maintained in good order; and the magnetic chamber in the observatory building and the magnetic hut in the garden have been kept in a thoroughly satisfactory condition.

EDWARD KITTO,

Superintendent and Magnetical Observer.

TABLE

DIURNAL INEQUALITY OF THE

(U)

1911.	1	2	3	4	5	6	7	8	9	10	11	No
January	- 54	- 88	- 31	- 4	- 11	- 15	- 27	- 47	- 80	- 36	+ 23	+
February	- 74	- 55	- 73	- 52	- 50	- 18	- 5	- 52	- 108	- 147	- 73	+
March	- 30	- 9	- 51	- 37	- 48	- 54	- 84	- 201	- 335	- 325	- 170	+
April	- 13	+ 9	+ 10	- 22	- 80	- 98	- 123	- 323	- 417	- 253	+ 24	+
May	- 67	- 63	- 68	- 80	- 143	- 202	- 294	- 369	- 291	- 124	+ 90	+
June	- 56	- 40	- 116	- 108	- 248	- 364	- 354	- 352	- 309	- 129	+ 38	+
July	- 118	- 150	- 144	- 156	- 215	- 292	- 357	- 431	- 402	- 217	+ 56	+
August	- 50	- 42	- 93	- 114	- 192	- 273	- 390	- 422	- 311	- 78	- 122	+
September	- 92	- 108	- 108	- 118	- 138	- 194	- 248	- 326	- 296	- 88	+ 22	+
October	- 92	- 52	- 40	- 59	- 63	- 79	- 69	- 187	- 223	- 98	+ 120	+
November	- 37	- 29	- 26	- 40	- 48	- 46	- 83	- 77	- 77	- 29	+ 144	+
December	- 57	- 20	- 6	- 10	- 16	- 51	- 67	- 69	- 19	- 92	- 146	+
Year	- 59	- 53	- 62	- 67	- 105	- 140	- 182	- 238	- 238	- 113	- 54	+
Winter	- 46	- 47	- 34	- 26	- 32	- 33	- 46	- 61	- 71	- 15	+ 60	+
Equinox	- 87	- 40	- 47	- 59	- 82	- 106	- 146	- 259	- 318	- 190	+ 25	+
Summer	- 65	- 74	- 105	- 115	- 199	- 285	- 344	- 393	- 326	- 134	+ 77	+

NOTE.—When the sign is + the Magnitude is less than the Declination Record of the

WALMOUTH DECLINATION.

(1901.)

3	14	15	16	17	18	19	20	21	22	23	24	N.O. Change	Range
17	+196	+130	+51	+45	+37	+2	-42	-81	-79	-134	-114	-10	351
139	+289	+234	+163	+116	+59	-6	-22	-55	-97	-136	-159	-92	448
124	+425	+383	+263	+112	+30	-33	-47	-59	-39	-52	-22	-40	760
186	+171	+297	+131	+35	-32	-52	-32	-26	-93	-71	-33	+6	903
190	+400	+329	+223	+124	+72	+39	+4	+31	-39	-93	-104	+62	769
118	+400	+374	+292	+206	+156	+88	+44	+12	-2	-50	-80	0	764
106	+624	+592	+438	+279	+72	-32	-34	-43	-57	-82	-104	+18	1055
168	+528	+451	+253	+104	+5	-40	-52	-81	-66	-58	-35	+32	950
120	+470	+350	+158	+36	-8	-6	-30	-48	-42	-64	-72	-48	846
160	+336	+243	+101	+7	-17	-31	-61	-92	-96	-100	-104	+52	583
156	+183	+71	+53	+29	+10	-80	-80	-92	-95	-87	-65	+6	351
54	+80	-27	+9	+19	-3	-28	-56	-58	-74	-61	-43	-42	242
152	+367	+281	+176	+93	+29	-15	-35	-55	-65	-82	-78		605
117	+187	+102	+64	+52	+18	-28	-50	-72	-86	-104	-95		321
23	+425	+308	+163	+48	-7	-32	-43	-56	-67	-72	-58		743
13	+488	+437	+302	+178	+76	+14	-11	-36	-41	-71	-81		881

ints to the West of its mean position.

ly 15th was not available.

TABLE

DIURNAL INEQUALITY OF THE

(Unit 0.1γ)

1911.	1	2	3	4	5	6	7	8	9	10	11	No.
January	- 4	- 9	- 3	+ 6	+ 24	+ 26	+ 51	+ 35	+ 22	+ 5	- 60	- 1
February	+ 23	+ 52	+ 42	+ 19	+ 41	+ 50	+ 80	+ 87	+ 47	+ 6	- 53	- 1
March	+ 58	+ 38	+ 31	+ 31	+ 38	+ 48	+ 69	+ 73	+ 19	- 79	- 166	- 1
April	+ 83	+ 55	+ 64	+ 50	+ 48	+ 50	+ 12	- 21	101	- 196	241	- 1
May	+ 44	+ 74	+ 38	+ 53	+ 27	- 6	- 24	- 60	- 94	- 124	- 140	- 1
June	+ 54	+ 44	+ 18	+ 5	+ 22	- 11	- 56	- 93	- 124	- 128	129	-
July	+ 63	+ 19	- 8	+ 1	- 19	- 40	- 47	- 102	- 156	- 206	- 191	- 1
August	+ 51	+ 65	+ 44	+ 40	+ 42	+ 13	- 29	- 79	123	- 140	- 127	- 1
September	+ 67	+ 38	+ 30	+ 36	+ 38	+ 33	- 26	- 55	- 143	- 201	- 211	- 1
October	+ 32	+ 32	+ 46	+ 41	+ 70	+ 65	+ 48	+ 21	65	- 135	- 155	- 1
November	+ 15	- 2	+ 13	+ 32	+ 45	+ 53	+ 58	+ 21	- 23	- 51	- 57	-
December	- 17	- 11	- 7	+ 1	+ 10	+ 22	+ 29	+ 2	- 43	- 68	- 53	-
Year	+ 39	+ 33	+ 26	+ 26	+ 32	+ 25	+ 11	- 14	- 65	- 110	- 133	- 1
Winter	+ 4	+ 7	+ 11	+ 14	+ 30	+ 38	+ 54	+ 36	+ 1	- 28	- 56	-
Equinox	+ 60	+ 44	+ 43	+ 40	+ 48	+ 49	+ 26	+ 4	- 73	- 153	- 193	- 1
Summer	+ 53	+ 50	+ 23	+ 25	+ 18	- 11	- 39	- 83	- 124	- 149	- 149	- 1

NOTE.—The Horizontal Force Rec

I.

WALMOUTH HORIZONTAL FORCE.

 $\times 10^{-6}$ C.G.S.)

3	14	15	16	17	18	19	20	21	22	23	24	Range
71	- 8	- 4	- 15	- 10	+ 14	+ 17	+ 30	+ 48	+ 15	+ 7	- 5	160
70	- 59	- 55	- 60	46	- 31	- 13	- 17	+ 3	- 2	- 1	+ 36	171
149	- 93	- 69	- 15	- 4	+ 23	+ 38	+ 61	+ 54	+ 58	+ 60	+ 47	271
83	- 8	- 6	+ 17	+ 32	+ 35	+ 62	+ 66	+ 67	+ 72	+ 58	+ 66	321
118	- 91	- 56	- 5	+ 43	+ 78	+ 82	+ 102	+ 95	+ 78	+ 66	+ 51	242
71	- 36	+ 12	+ 34	+ 55	+ 90	+ 76	+ 88	+ 76	+ 75	+ 51	+ 44	219
38	+ 16	+ 58	+ 70	+ 82	+ 64	+ 84	+ 121	+ 119	+ 102	+ 77	+ 61	327
66	- 4	- 12	+ 2	+ 44	+ 52	+ 79	+ 94	+ 59	+ 33	+ 41	+ 58	234
63	+ 5	+ 16	+ 44	+ 31	+ 18	+ 74	+ 85	+ 77	+ 72	+ 77	+ 61	296
96	- 49	- 16	- 11	- 4	+ 26	+ 45	+ 48	+ 54	+ 58	+ 51	+ 41	225
31	- 14	- 28	- 23	- 25	+ 2	+ 15	+ 14	+ 18	+ 14	+ 8	+ 12	115
31	+ 42	+ 17	+ 3	0	+ 17	+ 47	+ 28	+ 11	0	- 22	- 9	115
69	- 25	- 12	+ 3	+ 17	+ 35	+ 52	+ 60	+ 57	+ 48	+ 40	+ 39	193
35	- 10	- 18	- 24	- 20	0	+ 16	+ 14	+ 20	+ 7	- 2	+ 8	122
98	- 36	- 19	+ 9	+ 14	+ 33	+ 60	+ 66	+ 63	+ 65	+ 64	+ 54	259
73	- 29	0	+ 25	+ 56	+ 71	+ 80	+ 101	+ 87	+ 72	+ 59	+ 54	250

July 15th-16th was not available.

TABL

DIURNAL INEQUALITY OF TE

(Unit 0.173

1911.	1	2	3	4	5	6	7	8	9	10	11	No
January	- 7	+ 5	+ 14	+ 20	+ 18	+ 22	+ 22	+ 25	+ 1	- 20	- 45	-
February	- 6	0	- 4	+ 1	0	- 6	- 12	- 17	- 22	- 33	- 87	-
March	+ 14	+ 4	+ 1	+ 1	+ 5	- 6	- 6	0	- 2	- 39	- 76	-
April	+ 7	+ 10	+ 13	- 21	- 19	+ 15	+ 22	+ 21	+ 13	- 31	- 103	-
May	+ 20	+ 25	+ 24	- 19	- 18	+ 8	+ 4	- 4	- 42	- 86	- 134	-
June	+ 17	+ 12	+ 9	+ 17	+ 19	+ 21	+ 6	- 7	- 33	- 65	- 118	-
July	+ 20	+ 25	+ 20	+ 31	+ 43	+ 32	- 32	+ 21	- 29	- 95	- 176	-
August	+ 20	+ 21	+ 23	- 23	- 34	+ 36	+ 36	+ 20	- 24	- 96	- 125	-
September.. ..	- 4	+ 4	+ 28	+ 47	+ 61	+ 70	+ 61	+ 51	+ 15	- 27	- 102	-
October	+ 11	+ 4	+ 5	- 4	- 1	- 8	- 1	+ 7	- 6	- 45	- 80	-
November.. ..	+ 32	+ 43	+ 44	+ 45	+ 23	+ 12	+ 8	- 40	- 72	- 91	- 109	-
December	+ 4	+ 2	- 15	- 29	- 15	- 1	- 1	- 4	- 13	- 8	- 8	+
Year	+ 11	+ 13	+ 14	+ 17	+ 19	+ 16	+ 14	- 6	- 18	- 53	- 97	-
Winter	+ 6	+ 12	+ 10	+ 9	+ 7	+ 7	- 4	- 9	- 26	- 38	- 62	-
Equinox	+ 7	+ 6	+ 12	+ 18	+ 21	+ 18	+ 19	+ 20	+ 5	- 36	- 90	-
Summer	+ 22	+ 21	+ 21	+ 23	+ 23	+ 25	+ 20	+ 7	- 32	- 85	- 138	-

NOTE.—The Vertical Force Rec

I.

ALMOUTH VERTICAL FORCE.

 $\times 10^{-6}$ C.G.S.)

	14	15	16	17	18	19	20	21	22	23	24	N.O. Change	Range
12	- 37	- 6	+ 4	+ 14	+ 33	+ 28	+ 24	+ 16	+ 6	- 11	- 6	- 77	95
71	- 21	+ 20	+ 51	+ 73	- 68	- 61	+ 40	+ 32	+ 19	+ 10	- 1	- 29	167
30	- 50	- 1	+ 31	+ 60	- 55	- 52	+ 32	+ 25	+ 20	+ 20	+ 18	- 43	140
39	- 66	+ 3	+ 41	+ 49	+ 57	+ 54	- 45	+ 31	+ 14	- 3	+ 6	- 65	206
17	- 67	- 15	+ 27	+ 52	+ 70	+ 74	+ 73	+ 71	+ 53	+ 36	+ 26	+ 69	220
11	- 78	- 37	+ 14	+ 45	+ 79	+ 80	+ 76	+ 63	+ 49	+ 40	+ 27	- 15	204
12	- 107	- 33	+ 26	+ 86	+ 110	- 100	- 59	+ 43	+ 33	+ 22	+ 22	+ 15	286
13	- 91	+ 3	+ 69	+ 82	+ 77	+ 54	+ 36	+ 32	+ 10	+ 15	+ 19	+ 16	232
24	- 65	- 8	+ 26	+ 36	+ 26	+ 23	+ 22	+ 7	- 2	- 4	- 3	- 48	205
14	- 41	- 9	+ 26	+ 38	- 39	+ 50	+ 45	+ 37	+ 26	+ 23	+ 15	+ 69	130
35	- 20	+ 14	+ 23	+ 12	+ 50	+ 41	+ 27	+ 16	+ 7	+ 17	+ 31	+ 73	159
13	+ 35	+ 56	+ 44	+ 24	+ 7	- 13	- 26	- 20	- 12	- 16	- 9	+ 83	85
35	- 50	- 1	+ 32	+ 50	+ 56	+ 50	+ 38	+ 29	+ 19	+ 12	+ 12		160
14	- 10	+ 21	+ 30	+ 38	+ 39	+ 29	+ 16	+ 11	+ 5	0	+ 4		101
39	- 56	- 4	+ 51	+ 46	+ 44	+ 45	+ 36	+ 25	+ 15	+ 9	+ 9		155
23	- 86	- 20	+ 34	+ 66	+ 84	+ 77	+ 61	+ 52	+ 36	+ 28	+ 24		228

July 15th was not available.

TABLE

DIURNAL INEQUALITY OF THE

(U)

1911.	1	2	3	4	5	6	7	8	9	10	11	12
January	+ 1	+ 7	+ 6	+ 2	- 11	- 11	- 28	- 16	- 14	- 9	+ 27	+ 4
February	- 17	- 35	- 29	- 13	- 27	- 35	- 57	- 63	- 38	14	+ 10	+ 4
March	- 35	- 21	- 20	- 20	- 24	- 34	- 48	49	13	+ 42	+ 89	+ 4
April	- 54	- 21	- 39	- 27	- 27	- 29	- 2	+ 20	+ 71	+ 122	+ 131	+ 4
May	- 21	- 42	- 19	- 30	- 13	+ 7	+ 17	+ 39	51	- 58	+ 55	+ 4
June	- 31	- 26	- 9	+ 2	- 9	+ 14	+ 39	+ 60	+ 74	+ 67	+ 52	+ 4
July	- 36	- 6	- 11	+ 5	25	+ 36	41	+ 74	+ 86	110	+ 77	+ 4
August	- 28	- 37	- 23	- 20	- 18	+ 2	+ 30	+ 59	+ 75	+ 66	+ 55	+ 4
September	- 46	- 24	- 12	- 11	- 8	- 2	+ 55	+ 52	+ 100	+ 127	+ 112	+ 4
October	- 18	- 20	- 29	- 26	- 47	- 46	- 32	- 12	+ 42	+ 77	+ 81	+ 4
November	- 1	+ 14	+ 4	- 9	- 23	- 32	- 37	26	- 6	+ 10	+ 6	+ 4
December	+ 13	+ 8	0	- 9	- 11	- 15	- 20	- 3	+ 25	+ 43	+ 33	+ 4
Year	- 23	- 18	- 15	- 13	- 16	- 12	- 5	+ 11	+ 39	+ 58	+ 61	+ 4
Winter	- 1	- 2	- 5	- 7	- 18	- 23	- 35	- 27	- 8	+ 8	+ 19	+ 4
Equinox	- 38	- 26	- 25	- 21	- 26	- 28	- 12	+ 3	+ 50	+ 92	+ 103	+ 4
Summer	- 29	- 28	- 15	- 10	- 4	+ 15	+ 32	+ 58	+ 74	+ 75	+ 60	+ 4

√.

ALMOUTH INCLINATION.

01.)

	14	15	16	17	18	19	20	21	22	23	24	Range
20	- 5	+ 1	+ 11	+ 11	0	- 3	- 13	- 27	- 8	- 8	+ 1	84
26	+ 33	+ 43	+ 55	+ 52	+ 40	+ 26	+ 23	+ 7	+ 7	+ 3	- 24	118
77	+ 48	+ 46	+ 19	+ 20	+ 1	24	- 34	- 29	- 33	- 34	- 26	159
31	14	+ 8	+ 1	7	- 7	- 26	- 31	- 36	- 44	- 46	- 43	185
15	+ 41	+ 33	+ 11	14	39	- 33	47	- 43	- 37	- 34	- 27	105
15	+ 1	19	- 19	24	37	27	- 37	- 32	- 36	- 23	- 22	111
16	42	- 29	- 39	30	11	- 27	- 64	- 67	- 59	- 45	- 35	177
7	- 24	+ 9	+ 19	5	- 13	- 37	- 52	- 30	- 19	- 23	- 33	127
6	- 22	- 13	- 22	- 10	- 25	- 43	- 51	- 50	- 49	- 53	- 42	178
46	+ 21	+ 8	+ 15	+ 14	- 6	- 15	- 19	- 25	- 31	- 28	- 23	128
5	+ 4	+ 23	+ 22	+ 29	+ 13	+ 2	- 2	- 7	- 7	0	+ 1	66
17	- 17	+ 5	+ 11	+ 11	- 10	- 35	- 26	- 13	- 4	+ 10	+ 3	78
21	+ 2	+ 10	+ 7	+ 4	7	- 20	- 29	- 29	- 27	- 23	- 23	90
11	+ 4	+ 18	+ 26	+ 26	+ 11	- 2	- 4	- 10	- 3	+ 1	- 5	63
10	+ 8	+ 12	+ 3	+ 4	- 9	- 27	- 34	- 35	- 39	- 40	- 24	143
3	- 6	- 2	- 7	- 18	- 28	- 31	50	- 43	- 38	- 31	- 29	125

TABLE V.
MEAN MONTHLY AND ANNUAL VALUES.
FALMOUTH OBSERVATORY, 1911.

1911.	Declination	Inclination	Horizontal Force	Total Force	North Component	West Component	Vertical Force
January	17 37.2	66 28.9	0.18796	0.47103	.17914	.05690	0.43190
February	17 36.3	66 28.1	0.18806	0.47106	.17925	.05688	0.43187
March	17 35.8	66 29.0	0.18788	0.47086	.17909	.05680	0.43177
April	17 34.5	66 27.7	0.18796	0.47065	.17919	.05676	0.43150
May	17 34.6	66 27.9	0.18798	0.47076	.17920	.05677	0.43159
June	17 32.8	66 27.6	0.18823	0.47129	.17947	.05675	0.43208
July	17 32.8	66 28.6	0.18788	0.47073	.17914	.05664	0.43161
August	17 32.7	66 27.0	0.18801	0.47056	.17927	.05668	0.43136
September	17 31.0	66 28.9	0.18776	0.47053	.17905	.05651	0.43144
October	17 30.7	66 29.1	0.18771	0.47047	.17901	.05648	0.43140
November	17 29.4	66 27.7	0.18802	0.47080	.17933	.05651	0.43164
December	17 28.3	66 28.0	0.18835	0.47172	.17966	.05655	0.43251
Year	17 33.0	66 28.2	0.18798	0.47087	.17923	.05669	0.43172

FALMOUTH OBSERVATORY.

METEOROLOGICAL
AND
MAGNETICAL TABLES
AND
REPORTS

FOR THE YEAR 1912,

AND

TABLES OF SEA TEMPERATURE, WITH NOTES,

BY

WILSON LLOYD FOX, F.R. Met. Soc.

(Hon. Sec. Observatory Committee),

AND

EDWARD KITTO, F.R. Met. Soc.

(Superintendent Falmouth Observatory).

FALMOUTH :

J. H. LAKE AND CO., PRINTERS, MARKET STRAND.

1913.



3

REPORT
OF THE
OBSERVATORY COMMITTEE
OF THE
Royal Cornwall Polytechnic Society
FOR THE YEAR 1912.

COMMITTEE :—

Mr. H. DYKE ACLAND, F.G.S.	Major LUARD, R.E.
Mr. J. DAVIES ENYS, F.G.S.	Capt. ARTHUR ROGERS, R.N.R.
Mr. HOWARD FOX, F.G.S.	Mr. WALTER ROGERS, B.A.
Mr. ROBERT FOX.	Mr. WILSON LLOYD FOX, J.P.
	F.R.Met. Soc., <i>Hon. Sec.</i>

STAFF :—

Mr. EDWARD KITTO, F.R.Met.Soc., Superintendent, appointed 1882.
Mrs. E. KITTO, Assistant, appointed 1890.
Mr. J. B. PHILLIPS, Assistant, appointed 1899.

In presenting their Report for 1912 your Committee deeply regret to record the loss of their valued colleague and chairman, Mr. J. D. Enys, F.G.S. As long as health permitted he attended the meetings of the Committee, and took a lively interest in the affairs of the Observatory.

METEOROLOGICAL.

The self-recording instruments at the Falmouth Observatory have continued to record with precision the hourly values of the meteorological elements throughout the year 1912. The

instructions of the Meteorological Office have been strictly carried out, and all necessary measures taken for the proper and efficient working of the Observatory.

The results, including Barometric Pressure, Dry Bulb Temperature, Humidity, Wind Direction and Force, Rainfall and Bright Sunshine, are published by the Meteorological Office monthly, and also in a yearly volume entitled "The British Meteorological Year Book."

The annual maintenance grant of £250 has been received from the Meteorological Office as usual.

The accounts have been kept by Mr. W. W. J. Sharpe, the treasurer, and audited by Messrs. F. J. Bowles and Harold B. Carlyon.

The Observatory was inspected by Mr. Ernest Gold, M.A., of the Meteorological Office, from the 13th to the 17th of July.

The Climatological Observations have been taken with care and regularity. These observations are furnished daily to the "Western Morning News" and "Western Daily Mercury," and weekly to the "Falmouth Packet." Monthly summaries are also sent to, and published by, the Plymouth Daily Papers, the "Falmouth Packet," and the Cornwall County Council.

Dr. H. R. Mill, Editor of "British Rainfall," has been supplied with particulars of the rainfall at Falmouth monthly during 1912, and at various other places in Cornwall and Devon, for use in his rainfall publication for Great Britain.

In addition, articles on special meteorological phenomena have been occasionally furnished to the Press by the Superintendent.

Captain W. White, of the tug "Perran," has continued the series of Sea Temperature Observations. Tables and notes prepared by your Honorary Secretary will be published in your Annual Report, together with the usual meteorological tables, compiled by Mr. Edward Kitto, the Superintendent.

MAGNETICAL.

The Magnetical Department has been efficiently maintained, and the self-recording instruments have worked satisfactorily, and, with one exception, continuously throughout the year.

On the 26th October, at 6.17 a.m., the suspension wire of the Horizontal Force Magnet broke. The delicate task of re-suspending was accomplished, and the record re-started at 8.30 p.m.

A report on the work of Falmouth Magnetic Observatory, drawn up by Dr. W. N. Shaw, F.R.S., on behalf of the Falmouth Magnetograph Committee, was submitted to the meeting of the British Association at Dundee in September last.

In March last your Committee received intimation from the Government Grant Committee of the Royal Society that the sum of £75 had been placed at their disposal for the continuance of Magnetic Observations at Falmouth for 1911-12. Your Committee expressed to the donors their appreciation of this recognition of the work which was being done at the Observatory.

Tables of diurnal inequality of magnetic declination, inclination, and of horizontal and vertical force at Falmouth for 1912, derived from hourly tabulations of the photographic curves, and prepared by Mr. Kitto, will be published in your Annual Report. These are substituted for the hourly values of magnetic declination, inclination, and force published prior to 1911, so as to be in conformity with the data published by other British Magnetic Observatories.

Particulars of the daily magnetic condition as regards disturbance according to a prescribed scale have, at the request of the International Conference on Terrestrial Magnetism, been sent quarterly to Dr. E. Van Everdingen, Director-in-Chief, Royal Meteorological Institute of Pays-Bas, De Bilt, Holland, for publication with similar data from other Magnetic Observatories.

In June last, tracings of the Falmouth Magnetograms—horizontal and vertical force, and declination—of September

25th, 1909, and of February 21st and 22nd, 1911, together with the scale values of the several curves were sent, at his request, to Dr. David Stenquist, Stockholm, who presented an interesting paper on "The Light Phenomena in the Atmosphere, May, 1910."

Information as to magnetic declination has been furnished to the Heriott-Watt College, Edinburgh; other requests for information have also been complied with.

The year, on the whole, has been free from magnetic disturbances of exceptional magnitude.

An important work entitled "Studies in Terrestrial Magnetism," by Dr. Charles Chree, F.R.S., has, by purchase, been added to the Library of the Observatory.

Many valuable publications from both British and Foreign Institutions have been presented to the Observatory Library during the year, for which the Committee tendered grateful acknowledgment.

The question which has arisen as to the continuance of the Observatory has engaged the unremitting attention of your Committee and others interested in the matter. Further reference thereto is made in the Annual Report of your Council for 1912.

WILSON LLOYD FOX.

Meteorological Tables and Notes for Falmouth.

The Bright Sunshine was 1,467 hours, or 305 hours below the average of the past 30 years, and the lowest by 68 hours recorded during that period. It was 588 hours less than that of 1911, and affords a striking contrast to most years, such as 1893, when there were 2,088 hours.

Two months only showed a sunshine above the average, viz., April and October. The holiday month of August, instead of experiencing an average of 214 hours, had 104 only, being 44 hours less than the previous lowest. It contrasts with the highest recorded August sunshine of 297 hours in 1899. The total number of days on which bright sunshine occurred was 285, being 20 less than the average of the last 30 years. This is 38 less than the maximum number of 323 in the jubilee year, 1887, and only two more than the least, viz., 283 in 1865.

Table of Bright Sunshine at Falmouth for the Year 1912.

1912.	Number of hours of Bright Sunshine.	Greatest amount in one day.	Number of days on which Bright Sunshine occurred.	Percentage of Possible Duration.	Mean number of hours of Bright Sunshine for 30 years, 1881-1910.	Mean number of days on which Bright Sunshine occurred in 30 years, 1881-1910.
January ..	49.8	7.0	15	19	58.2	20
February ..	62.3	7.9	17	22	85.4	21
March.....	106.9	9.9	25	29	141.1	27
April	220.6	13.0	27	54	184.3	27
May	189.7	14.4	29	40	232.1	29
June	178.7	14.6	27	37	225.5	28
July	154.7	12.4	26	32	223.9	29
August	104.0	10.3	25	21	213.8	30
September..	156.9	10.9	29	42	162.8	27
October	139.0	9.4	27	43	115.6	26
November..	59.8	7.1	21	22	74.8	22
December ..	44.7	5.4	17	18	54.8	19
Sums	1467.1	122.3	285	382	1772.3	305
Means	122.3	10.2	24	32	147.7	25.4

The records are from the Campbell-Stokes Bright Sunshine Recorder, the property of the Meteorological Office.

CLIMATOLOGICAL STATION.

OBSERVATIONS taken at the FALMOUTH OBSERVATORY during 1912.
Height above mean sea level, 167 feet.

1912.	Means at 9 a.m. (local time.)			TEMPERATURE.						Cloud, 0-10.	RAIN.	
				MEANS.			EXTREMES.					
	Dry.	Wet.	Hy.	Max.	Min.	Rnge.	Max.	Min.	Rnge.		Amnt.	No. of days.
	°	°	°/10	°	°	°	°	°	°		In.	
Jan. . . .	44.9	43.8	90	49.7	40.9	8.8	52.8	28.4	24.4	8.0	5.35	16
Feb. . . .	45.5	44.6	93	49.5	41.2	8.3	54.9	21.3	33.6	7.8	4.62	22
March. . .	47.8	46.1	87	51.3	42.9	8.4	55.6	38.3	17.3	6.9	6.97	27
April. . .	52.2	48.0	73	56.1	44.1	12.0	64.8	35.0	29.8	4.7	0.21	7
May . . .	55.8	52.5	79	60.2	48.6	11.6	66.8	42.1	24.7	6.3	2.01	15
June . . .	57.7	54.8	82	61.6	51.1	10.5	65.8	41.9	23.9	7.0	4.23	22
July . . .	61.1	58.4	83	65.4	55.7	9.7	79.3	47.0	32.3	6.9	4.31	20
Aug. . . .	56.8	54.4	84	59.4	51.0	9.4	63.9	44.8	19.1	8.3	10.56	28
Sept. . . .	56.3	53.3	81	60.1	51.0	9.1	65.9	42.5	23.4	6.4	0.99	6
Oct. . . .	52.1	50.2	87	56.7	46.0	10.7	61.5	37.9	23.6	5.3	4.79	19
Nov. . . .	47.7	46.1	88	51.2	43.6	7.6	57.0	32.9	24.1	7.3	3.75	20
Dec. . . .	48.7	47.8	93	51.8	44.8	7.0	54.0	33.4	20.6	7.2	7.72	24
Means. . .	52.2	50.0	85	56.1	46.7	9.4			24.7	6.8	55.51 4.63	226 19

The above table is a summary of observations taken from thermometers, divided on the stem and verified, placed in a Stevenson screen, with an excellent exposure, at a height of 4 feet over grass, and of 167 feet above mean sea level. The rainfall is from the 8-inch copper rain gauge, two feet high, the property of the Meteorological Office. The rainfall is taken at 10.30 a.m., and with the maximum temperature is entered to the previous day.

Temperature.—The mean was $52^{\circ}2$. This is $0^{\circ}3$ above the average temperature of the last 30 years. April and December had respective means of $52^{\circ}2$ and $48^{\circ}7$, which are the highest since 1882, with the exception of $54^{\circ}7$ and $49^{\circ}0$ in 1893 and 1899 respectively. July was the warmest month with $61^{\circ}1$ as compared with $67^{\circ}2$ in 1911 (a record), and a mean of $62^{\circ}2$ for the last 30 years. August (with a record rainfall) also furnished a record for the lowest temperature for that month during the same period with $56^{\circ}8$. The nearest approach to it being $59^{\circ}5$ in 1891. The first five months and October and December were considerably above the average, and the rest considerably below.

Rainfall.—In 1912 the rainfall was 55.5 inches. This is the largest quantity since 1882, when 59 inches fell, and is 15 inches more than fell in 1911, and over 13 inches above the mean annual rainfall of the past 30 years. The total of the first six months was 23.4, and of the last 32.1 inches. The months of January, February, March, June, July, August and December were above the average. The months of April, May, September, October, and November were below. March and August created records with 7.0 and 10.6 inches respectively. This August rainfall was 7.5 inches above the average, and since 1882 has only once been exceeded in any month, viz., in December, 1896, when there was 0.1 of an inch more. In April 0.21 inch fell, which is the minimum since 1893 when it was 0.08. September was notable for having less than one inch.

Humidity.—Naturally during such an exceptionally wet year the humidity was very high. It amounted to 85%, which is a record, and 3% higher than the mean of the last 30 years. It reached 90% in January, and 93 in February and December. On no previous occasion during the same period had it been 90 or over for three months in one year. The 93 in February is the greatest for that month. The 93 of December has only been equalled once, viz., in 1905.

Wind.—The large proportion of days of wind from two of the four Cardinal points viz., S. (111) and W. (129) relatively to

N. (76) and E. (50) accounts to a great extent for the unusually wet character of the year. The mean relative proportions for 40 years are wind from the N., 7·1; from the E., 5·0; from the S., 7·9; and from the W., 10·3. For 1912 the equivalents were N., 6·3; E., 4·2; S., 9·3; and W., 10·7. Thus the number of days on which the wind blew from a southerly or westerly direction, which are at Falmouth the most rainy quarters, were nearly twice as many as from the other two.

The mean velocity of 12 miles per hour is 0·1 less than that for 40 years. All the maximum velocities were from points of the compass ranging from W.N.W. to S.W. with the one exception of a strong breeze from the N. on the 1st of April. The highest means were for the months of March 16·2, and December 17·6. In the latter month on the 26th a storm of exceptional violence was experienced. The wind at noon attained a higher maximum velocity, viz., of 58 miles per hour, than has been recorded for the past 12 years by the Robinson cup anemometer. The wind, as registered by the Dines anemometer at Pendennis Castle, reached in gusts a velocity of 98 miles at 8 and 8 30 a.m., and of an estimated rate of over 100 miles at noon and 1 p.m. Between 4 and 5 a.m. the storm was accompanied by thunder, lightning and hail. One of the flashes was very vivid, and was followed almost immediately by a loud clap of thunder. The lightning on this occasion appears to have struck a pointed group of rocks on Pennance Point about 1 mile in a direct south line from the nearest Falmouth houses. Mr. John Henry Barclay has described the effect as follows:—"The topmost point of rock has been to a great extent broken off, and what remained was all splintered into fragments; the cracks appearing to go down deep into the rock. I could easily have pulled out many pieces of stone. The ground for some yards around was strewn with bits of broken stone. These, as well as the broken crag itself, showed quite fresh fractures."

TABLE SHOWING THE TEMPERATURE OF THE
SEA OFF FALMOUTH AND IN THE CENTRE OF
THE HARBOUR DURING 1912

from observations taken by Captain White, of the steam tug
"Perran," about one mile outside Falmouth Harbour, or in
the centre of the Harbour, with the differences from the Air
Temperatures taken from the Thermograph at the Falmouth
Observatory.

1912.	Number of Daily Observations.	Means.	Difference from Air.	Absolute Maximum.	Difference from Air.	Absolute Minimum.	Difference from Air.	Monthly Range.	Difference from Air.	Means for 31 years, 1872 to 1885 and 1894 to 1910.
		°	°	°	°	°	°	°	°	°
January	25	47.8	+2.8	49.5	-3.5	45.0	+15.1	4.5	-18.6	48.2
February	20	46.6	+0.6	48.5	-6.4	45.0	+22.3	3.5	-28.7	47.1
March ..	25	48.5	+1.5	50.0	-6.0	47.5	+12.4	2.5	-18.4	47.3
April	23	50.9	+0.6	55.0	-7.7	48.5	+11.5	6.5	-19.2	48.8
May	24	54.8	+0.6	56.0	-7.3	54.0	+10.5	2.0	-17.8	51.9
June	20	55.0	-1.2	56.5	-9.6	54.5	+11.6	2.0	-21.2	53.5
July	25	58.6	-1.4	62.0	-14.4	54.5	+5.9	7.5	-20.3	58.2
August ..	24	56.2	+0.9	57.5	-5.3	55.5	+9.4	2.0	-14.7	59.7
September	16	56.3	+1.5	57.5	-5.8	55.0	+11.2	2.5	-17.0	58.9
October	24	54.5	+3.8	55.5	-4.8	53.5	+14.6	2.0	-19.4	56.9
November	24	51.9	+4.0	54.0	-2.8	50.0	+15.6	4.0	-18.4	53.5
December	25	50.0	+1.1	51.0	-3.7	48.5	+14.2	2.5	-17.9	50.3
Means ..	23	52.6	+1.2	54.4	-6.4	51.0	+12.9	3.5	-19.3	53.0

Additional Sea Temperatures taken during 1912.

1912.	Place of Observation.			Temp- erature.	1912.	Place of Observation.			Temp- erature.
				°					°
January	9	Moorings	.. ..	49·0	July	4	Moorings	.. ..	57·0
"	26	Ditto	.. ..	46·0	"	27	Ditto	.. ..	61·5
February	2	Ditto	.. ..	43·5	August	1	Ditto	.. ..	57·5
"	3	Ditto	.. ..	43·0	"	2	Ditto	.. ..	57·5
"	5	Ditto	.. ..	41·5	"	23	Inner Harbour	.. ..	55·0
"	6	Ditto	.. ..	42·0	Sept.	2	Moorings	.. ..	56·5
"	7	Ditto	.. ..	43·0	"	10	Ditto	.. ..	56·0
March	18	Ditto	.. ..	48·0	"	12	Ditto	.. ..	56·0
April	15	Ditto	.. ..	49·5	"	15	Ditto	.. ..	56·5
"	16	Ditto	.. ..	50·0	"	14	Ditto	.. ..	56·0
"	17	Ditto	.. ..	51·0	"	25	Ditto	.. ..	55·5
"	18	Ditto	.. ..	52·0	"	26	Ditto	.. ..	55·0
May	15	Ditto	.. ..	56·0	"	27	Ditto	.. ..	55·0
"	22	Ditto	.. ..	55·5	"	28	Ditto	.. ..	55·0
"	23	Ditto	.. ..	55·0	October	14	Ditto	.. ..	55·5
"	24	Ditto	.. ..	55·0	"	18	Ditto	.. ..	55·0
June	7	Ditto	.. ..	55·5	"	19	Ditto	.. ..	54·5
"	18	Ditto	.. ..	55·0	Nov.	6	Ditto	.. ..	53·0
"	25	Ditto	.. ..	56·5	"	7	Ditto	.. ..	53·0
"	26	Ditto	.. ..	56·0	December	14	Ditto	.. ..	50·0
"	29	Ditto	.. ..	56·0					

FALMOUTH OBSERVATORY.

LATITUDE 50° 9' 0" N.; LONGITUDE 5° 4' 35" W.

Height above mean sea level, 167 feet.

13

DATE.	PRESSURE OF AIR.										TEMPERATURE OF AIR.									
	Mean pressure of the Air.	Mean of daily Maxima.	Mean of daily Minima.	Mean daily range.	Absolute Maximum.	Date of Maximum.	Absolute Minimum.	Date of Minimum.	Monthly range.	Mean elastic force of Vapour.	Mean Temperature.	Mean of daily Maxima.	Mean of daily Minima.	Mean daily range.	Absolute Maximum.	Date of Maximum.	Absolute Minimum.	Date of Minimum.	Monthly range.	
1912.																				
January	29.909	in. 30.047	in. 29.800	in. .247	in. 30.542	1.2	in. 29.014	6	in. 1.528	in. .252	° 45.0	° 48.3	° 40.9	° 7.1	° 53.0	6	° 29.9	31	° 23.1	
February	29.603	29.728	29.486	.642	30.216	27	28.771	8	1.145	.264	46.0	49.2	42.1	7.1	54.9	29	22.7	3	32.2	
March	29.784	29.899	29.593	.306	30.410	29	28.731	18	1.679	.208	47.0	51.2	43.2	8.0	56.0	26	35.1	20	20.9	
April	30.203	30.286	30.120	.166	30.512	3	29.475	1	1.067	.274	50.3	55.0	45.3	9.7	62.7	24	37.0	12	25.7	
May	30.003	30.091	29.931	.160	30.416	8	29.562	15	0.851	.316	54.2	60.0	48.9	11.1	63.3	28	43.5	1	19.8	
June	29.858	29.940	29.780	.160	30.176	26	29.919	4	0.857	.351	56.2	61.8	51.2	10.6	66.1	22	42.9	4	23.2	
July	29.929	29.989	29.880	.109	30.259	4	29.480	31	0.770	.437	60.0	64.7	59.1	5.6	70.4	16	48.6	9	27.8	
August	29.743	29.906	29.668	.238	30.252	22	29.241	6	1.011	.379	55.3	59.8	51.0	8.8	62.8	24	46.1	3	16.7	
September	30.160	30.250	30.104	.116	30.476	13	29.144	30	1.332	.346	54.8	58.8	51.0	7.8	63.3	3	43.8	30	19.5	
October	29.930	30.033	29.821	.212	30.664	4	29.241	30	1.423	.316	50.7	55.1	46.1	9.0	60.3	14	38.9	4	21.4	
November	30.086	30.191	29.978	.213	30.453	22	29.232	29	1.221	.278	47.9	51.3	44.1	7.2	56.8	8	34.4	30	22.4	
December	29.939	30.067	29.813	.254	30.390	3	29.138	26	1.252	.302	48.9	51.7	45.2	6.5	54.7	27	34.3	1	20.4	
Means	29.929	30.033	29.831	.202					1.203		51.4	55.6	47.4	8.2					22.8	

The readings of the Barometer have been taken at 9 A.M.

The readings of the Barometer have been reduced to 32° Fahrenheit at mean sea level, and corrected for index error and capillarity. The results given in the Table have been deduced from the daily mean of the twenty-four (1 a.m. to midnight) hourly measurements of the continuous photographic curves of the self-recording instruments, the property of the Meteorological Office.

MAGNETICAL OBSERVATIONS

FOR THE YEAR 1912,

Made at Falmouth Observatory, Latitude $50^{\circ} 9' 0''$ N.; and Longitude $5^{\circ} 4' 35''$ W. Height, 167 feet above mean sea level.

Photographic curves of Magnetic Declination and of Horizontal and Vertical Force variations have been regularly taken during the year.

The scale values of the Instruments were determined on the 1st January, 1912. The following values of the ordinates of the photographic curves were then found :—

Declination, 1 cm. = $0^{\circ} 11' \cdot 7$

Bifilar, 1 cm. δ H. = 0·00081

Balance, 1 cm. δ V. = 0·00050

Deflections of the bifilar and vertical force magnets were also made on the 30th June, 1912, when the scale values were found to be :—

Bifilar, 1 cm. δ H. = 0·00082

Balance, 1 cm. δ V. = 0·00050

Deflections of the bifilar were made on the 26th October (after new suspension) the result being :—

1 cm. δ H. = 0·0012

Deflections of the bifilar and vertical force were again made on the 31st December, which gave :—

Bifilar, 1 cm. δ H. = 0·0012

Balance, 1 cm. δ V. = 0·00057

The year has been unusually free from marked magnetic disturbances ; the principal movements were recorded on the following dates :—

April 5 ; September 17, 24 ; October 14 ; December 7.

Observations with the absolute instruments have been made four times a month, of which the following is a summary :—

Determinations of Horizontal Intensity, 48

Determinations of Inclination, 48

Determinations of Declination, 48

The mean values of the Magnetic Elements for the year 1912 are as follows :—

Declination, $17^{\circ} 24' \cdot 2$ W. ; Horizontal Force, 0.18799 C.G.S. ; Vertical Force, 0.43118 C.G.S. ; Inclination, $66^{\circ} 26' \cdot 6$ N.

The results in the following Tables, Nos. I, II, III, IV, are deduced from the magnetograph curves. The values in Table V. are also derived from the curves standardized by the absolute observations. These were made with the collimator magnet 66A and the mirror magnet 66c in the Unifilar Magnetometer No. 66, by Elliott Brothers, of London, and with the Inclinator No. 86, by Dover, of Charlton, Kent, employing needles 1 and 2, which are $3\frac{1}{2}$ inches in length.

The effects of temperature on the horizontal force curves are very small and are negligible, but a temperature correction has been determined and applied to the vertical force curves.

The time given is Greenwich Mean Time, which is 20 minutes 18 seconds earlier than local time.

The results are derived from the "quiet" days selected by International agreement at De Bilt, as below :—

January ...	2, 15, 16, 26, 27	July ...	...10, 11, 12, 15, 24
February ..	5, 6, 15, 20, 21	August ...	4, 8, 12, 13, 26
March ...	4, 17, 18, 19, 24	September...	2, 15, 16, 27, 28
April	1, 8, 11, 21, 28	October ...	2, 5, 18, 19, 31
May	1, 16, 22, 23, 26	November...	3, 12, 21, 29, 30
June	5, 6, 15, 19, 20	December ...	4, 5, 20, 21, 28

In the Tables the seasonal means are grouped as follows :—

Winter :—January, February, November, December.

Equinox :—March, April, September, October.

Summer :—May, June, July, August.

The results are printed in the Royal Cornwall Polytechnic Society's Annual Report, and in the Annual Publication of the Meteorological Office.

The whole of the instruments have been maintained in good order; and the magnetic chamber in the observatory building and the magnetic hut in the garden have been kept in a thoroughly satisfactory condition.

EDWARD KITTO,

Superintendent and Magnetical Observer.

TAB
DIURNAL INEQUALITY OF T
(U

1912	1	2	3	4	5	6	7	8	9	10	11
January	- 44	- 60	- 32	- 40	- 48	- 70	- 58	- 48	+ 10	+ 88	+148
February	- 57	- 65	- 47	- 49	- 72	- 58	- 73	- 90	- 64	+ 13	+113
March	- 56	- 21	- 32	- 44	- 67	- 72	-105	-193	-276	-207	+ 17
April	- 19	- 40	- 51	- 95	-108	-160	-263	-376	-384	-227	+ 27
May	- 53	- 42	- 91	-134	-231	-296	-299	-290	-251	-116	+ 43
June	- 22	- 2	- 12	- 54	- 98	-227	-359	-441	-443	-255	- 57
July	- 10	- 17	-116	-135	-243	-346	-343	-350	-325	-153	+ 46
August	- 49	- 63	- 87	-114	-178	-265	-281	-327	-232	- 42	+157
September.. ..	- 73	- 85	- 87	- 92	-120	-170	-276	-365	-355	-209	+ 92
October	- 56	- 54	- 30	- 41	- 49	- 81	-121	-232	-276	-180	+ 23
November.. ..	- 42	- 55	- 10	- 12	- 17	- 40	- 60	- 83	- 86	- 27	+ 99
December	- 31	- 12	+ 5	- 5	- 8	- 5	- 39	- 66	- 53	- 10	+ 48
Year	- 43	- 41	- 49	- 68	-103	-149	-190	-238	-228	-110	+ 63
Winter	- 44	- 43	- 21	- 26	- 36	- 43	- 59	- 72	- 48	+ 16	+102
Equinox	- 51	- 50	- 50	- 68	- 86	-121	-191	-291	-323	-206	+ 40
Summer	- 33	- 31	- 77	-109	-188	-283	-321	-352	-313	-141	+ 47

NOTE.—When the sign is + the Ma

MOUTH DECLINATION.

01.)

3	14	15	16	17	18	19	20	21	22	23	24	N.C. Change	Range
76	+110	+14	-2	+10	-20	-44	-50	-62	-60	-68	-52	+48	262
81	+229	+114	+4	+2	+18	-18	-57	-89	-85	-115	-89	-54	396
83	+353	+268	+149	+11	-28	-73	-66	-60	-53	-50	-54	+32	659
85	+483	+354	+216	+113	+4	-20	-29	-61	-50	-51	-33	+34	869
61	+414	+281	+170	+89	+55	+45	+32	-5	-18	-13	-60	-24	769
23	+383	+331	+243	+175	+127	+87	+38	+28	+30	+12	-14	-2	826
98	+413	+337	+228	+123	+22	+51	+35	+48	+29	+18	-3	-28	763
63	+546	+370	+109	-21	-87	-56	-54	-47	-65	-69	-88	+38	890
04	+497	+383	+231	+114	+40	-2	-40	-61	-93	-95	-90	-8	869
77	+340	+220	+90	+17	+15	+3	-25	-48	-42	-50	-55	+6	653
27	+173	+78	+33	+28	-6	-59	-54	-86	-83	-74	-64	+64	313
42	+114	+71	+56	+49	+1	-44	-57	-65	-88	-81	-47	-18	230
60	+338	+285	+127	+63	+12	-11	-27	-42	-48	-53	-54		598
06	+156	+69	+23	+22	-2	-41	-55	-76	-79	-84	-63		290
37	+418	+306	+171	+64	+8	-23	-40	-57	-59	-59	-58		760
36	+439	+330	+188	+92	+29	+32	+13	+6	-6	-13	-41		791

nts to the West of its mean position.

TABLE
DIURNAL INEQUALITY OF THE
(Unit 0.1)

1912	1	2	3	4	5	6	7	8	9	10	11	12
January	- 15	- 14	- 27	- 15	+ 11	+ 15	+ 15	- 11	- 27	- 71	- 59	-
February	- 15	- 19	- 24	- 18	+ 7	+ 2	+ 13	+ 4	- 15	- 58	- 48	-
March	+ 16	+ 23	+ 19	+ 23	+ 28	+ 37	+ 36	+ 13	- 71	- 115	- 96	-
April	+ 59	+ 46	+ 48	+ 35	+ 32	+ 19	+ 3	- 34	- 118	- 198	- 215	-
May	+ 56	+ 48	+ 32	+ 23	- 3	- 30	- 49	- 100	- 144	- 186	- 173	-
June	+ 62	+ 40	+ 29	+ 21	+ 28	+ 3	- 53	- 98	- 139	- 145	- 160	-
July	+ 61	+ 60	+ 31	+ 37	+ 39	+ 2	- 50	- 85	- 152	- 194	- 176	-
August	+ 56	+ 55	+ 54	+ 52	+ 37	- 2	- 49	- 116	- 203	- 211	- 155	-
September	+ 67	+ 56	+ 44	+ 43	+ 43	+ 39	+ 11	- 49	- 133	- 194	- 196	-
October	+ 44	+ 44	+ 41	+ 56	+ 57	+ 62	+ 59	+ 31	- 53	- 145	- 190	-
November	- 18	+ 5	+ 16	+ 38	+ 47	+ 50	+ 40	+ 12	- 28	- 74	- 100	-
December	- 20	- 14	- 13	+ 10	+ 20	+ 10	+ 13	+ 22	+ 1	- 26	- 40	-
Year	+ 29	+ 27	+ 21	+ 25	+ 29	+ 17	- 1	- 34	- 91	- 135	- 134	-
Winter	- 17	- 11	- 12	+ 4	+ 21	+ 19	+ 20	+ 7	- 20	- 57	- 62	-
Equinox	+ 46	+ 42	+ 39	+ 39	+ 40	+ 39	+ 27	- 10	- 94	- 163	- 174	-
Summer	+ 59	+ 51	+ 37	+ 33	+ 25	- 7	- 50	- 100	- 160	- 184	- 166	-

ALMOUTH HORIZONTAL FORCE.

 $\times 10^{-6}$ C.G.S.)

13	14	15	16	17	18	19	20	21	22	23	24	Range.
- 30	+ 50	+ 29	+ 20	+ 20	+ 19	+ 28	+ 21	+ 14	+ 11	- 7	- 8	121
- 43	+ 61	+ 42	- 6	- 23	+ 10	+ 11	+ 19	+ 24	+ 15	- 5	- 10	119
- 3	+ 18	+ 2	- 2	- 3	- 11	- 8	+ 28	+ 23	+ 24	+ 26	+ 21	152
- 143	- 51	+ 5	+ 58	+ 87	+ 76	+ 102	+ 88	+ 93	+ 75	+ 73	+ 67	317
- 51	- 3	+ 19	+ 28	+ 49	+ 93	+ 113	+ 120	+ 103	+ 79	+ 56	+ 42	306
- 127	- 77	- 41	- 4	+ 50	+ 110	+ 150	+ 121	+ 113	+ 101	+ 79	+ 73	310
- 84	- 47	+ 34	+ 54	+ 66	+ 66	+ 71	+ 103	+ 92	+ 81	+ 56	+ 47	297
- 22	- 11	+ 41	+ 45	+ 15	+ 57	+ 60	+ 77	+ 74	+ 62	+ 90	+ 72	301
- 80	- 15	+ 11	+ 26	+ 29	+ 37	+ 75	+ 89	+ 84	+ 67	+ 62	+ 70	285
- 123	- 67	- 25	- 3	- 3	+ 25	+ 57	+ 57	+ 54	+ 59	+ 66	+ 56	256
- 49	- 22	- 16	+ 5	- 1	+ 24	+ 37	+ 41	+ 47	+ 19	+ 11	+ 5	150
- 13	+ 31	+ 8	- 5	- 1	- 2	+ 16	+ 17	+ 13	- 10	- 20	- 19	71
- 49	- 11	+ 9	+ 18	+ 24	+ 42	+ 59	+ 65	+ 61	+ 49	+ 41	+ 35	200
- 9	+ 30	+ 16	+ 4	- 1	+ 13	+ 23	+ 24	+ 24	+ 9	- 5	- 8	92
- 86	- 29	- 2	+ 20	+ 27	+ 32	+ 56	+ 66	+ 64	+ 56	+ 57	+ 54	288
- 71	- 35	+ 13	+ 31	+ 45	+ 82	+ 99	+ 105	+ 96	+ 81	+ 70	+ 59	289

TABL

DIURNAL INEQUALITY OF TH

(Unit 0.1y

1912	1	2	3	4	5	6	7	8	9	10	11	12
January	+ 23	+ 11	+ 2	- 6	- 6	- 6	- 1	+ 2	- 16	- 19	- 31	- 2
February	+ 10	+ 10	+ 17	+ 18	+ 15	+ 1	- 7	- 25	- 34	- 41	- 58	- 6
March	+ 37	+ 39	+ 41	+ 36	+ 22	+ 4	- 12	- 19	- 28	- 47	- 105	- 11
April	+ 33	+ 33	+ 42	+ 38	+ 33	+ 30	+ 40	+ 30	- 1	- 34	- 86	- 11
May	+ 48	+ 44	+ 36	+ 33	+ 34	+ 19	+ 6	- 1	- 28	- 78	- 122	- 14
June	+ 1	- 4	0	+ 10	+ 23	+ 20	+ 26	+ 21	- 19	- 53	- 103	- 12
July	+ 29	+ 18	+ 5	+ 4	+ 12	+ 4	- 6	- 10	- 12	- 38	- 76	- 10
August	+ 24	+ 24	+ 23	+ 20	+ 29	+ 26	+ 31	+ 28	- 5	- 54	- 95	- 11
September.. .	+ 10	+ 24	+ 33	+ 39	+ 39	+ 41	+ 44	+ 38	- 1	- 32	- 76	- 10
October	+ 20	+ 15	+ 8	+ 5	+ 3	+ 2	+ 8	+ 16	+ 2	- 35	- 89	- 9
November.. ..	+ 14	+ 11	+ 11	+ 3	- 1	- 8	- 12	- 22	- 37	- 55	- 72	- 7
December	+ 8	+ 13	+ 12	+ 3	+ 5	+ 4	+ 2	+ 1	- 10	- 38	- 47	- 2
Year	+ 21	+ 20	+ 19	+ 17	+ 17	+ 11	+ 10	+ 5	- 16	- 44	- 80	- 9
Winter	+ 14	+ 11	+ 10	+ 4	+ 3	- 2	- 5	- 11	- 24	- 38	- 52	- 4
Equinox	+ 25	+ 28	+ 31	+ 30	+ 24	+ 19	+ 20	+ 16	- 7	- 37	- 89	- 10
Summer	+ 26	+ 21	+ 16	+ 17	+ 24	+ 17	+ 14	+ 9	- 16	- 56	- 99	- 12

I.

ALMOUTH VERTICAL FORCE.

 $\times 10^{-6}$ C.G.S.)

13	14	15	16	17	18	19	20	21	22	23	24	N.C. Change	Range
- 22	- 20	- 17	- 15	- 12	+ 4	+ 11	+ 25	+ 25	+ 22	+ 32	+ 38	- 30	69
- 56	- 28	+ 9	+ 41	+ 33	+ 45	+ 43	+ 26	+ 23	+ 7	+ 4	+ 7	+ 71	110
- 87	- 61	- 11	+ 32	+ 59	+ 56	+ 48	+ 25	+ 17	+ 11	+ 18	+ 35	- 50	170
-116	- 77	- 29	- 5	+ 17	+ 20	+ 22	+ 23	+ 26	+ 24	+ 24	+ 28	+ 36	158
-129	- 87	- 31	+ 24	+ 48	+ 48	+ 35	+ 11	+ 52	+ 50	+ 52	+ 52	+ 12	198
- 95	- 63	- 17	+ 18	+ 49	+ 58	+ 63	+ 68	+ 55	+ 36	+ 17	+ 10	+ 20	190
- 83	- 50	- 19	+ 11	+ 40	+ 47	+ 47	+ 47	+ 39	+ 32	+ 31	+ 32	+ 63	151
-106	- 58	- 7	+ 18	+ 42	+ 47	+ 31	+ 30	+ 19	+ 11	+ 15	+ 20	- 61	158
-118	- 78	- 28	+ 13	+ 38	+ 46	+ 34	+ 24	+ 14	0	- 2	+ 1	- 24	164
- 72	- 43	0	+ 34	+ 32	+ 36	+ 35	+ 31	+ 26	+ 20	+ 18	+ 26	- 30	129
- 33	+ 14	+ 29	+ 34	+ 41	+ 40	+ 35	+ 26	+ 19	+ 18	+ 4	+ 14	- 40	113
- 13	- 7	+ 2	+ 4	+ 14	+ 14	+ 11	+ 7	+ 6	+ 16	+ 11	+ 5	+ 9	63
- 78	- 47	- 10	+ 17	+ 34	+ 38	+ 35	+ 31	+ 27	+ 21	+ 19	+ 22		129
- 31	- 10	+ 6	+ 16	+ 20	+ 26	+ 25	+ 21	+ 18	+ 16	+ 13	+ 16		78
- 98	- 65	- 17	+ 18	+ 36	+ 40	+ 35	+ 26	+ 21	+ 14	+ 15	+ 22		145
-103	- 64	- 19	+ 18	+ 45	+ 50	+ 44	+ 46	+ 41	+ 32	+ 29	+ 28		171

TABLE
DIURNAL INEQUALITY OF THE
(U)

1912	1	2	3	4	5	6	7	8	9	10	11	12
January	- 4	- 6	- 18	- 12	+ 6	+ 8	+ 10	- 7	- 29	- 53	- 49	- 1
February	- 7	- 10	- 11	- 7	+ 9	+ 2	+ 11	- 5	- 20	- 51	- 49	- 1
March	+ 22	+ 27	+ 25	+ 26	+ 25	+ 26	+ 21	+ 3	- 56	- 91	- 95	- 1
April	+ 49	+ 41	+ 44	+ 35	+ 31	+ 21	+ 14	- 14	- 89	- 143	- 169	- 17
May	+ 52	+ 45	+ 32	+ 25	+ 8	- 15	- 35	- 67	- 105	- 147	- 152	- 14
June	+ 42	+ 27	+ 19	+ 17	+ 26	+ 8	- 28	- 60	- 99	- 113	- 137	- 14
July	+ 49	+ 45	+ 24	+ 26	+ 30	+ 2	- 35	- 60	- 105	- 141	- 140	- 14
August	+ 44	+ 44	+ 43	+ 41	+ 33	+ 6	- 24	- 70	- 137	- 157	- 131	- 14
September.. ..	+ 48	+ 44	+ 39	+ 40	+ 40	+ 38	+ 20	- 22	- 89	- 139	- 154	- 14
October	+ 35	+ 34	+ 32	+ 39	+ 39	+ 42	+ 42	+ 25	- 35	- 107	- 153	- 14
November .. .	- 8	+ 7	+ 14	+ 26	+ 31	+ 31	+ 23	+ 1	- 30	- 66	- 88	- 14
December .. .	- 11	- 6	- 5	+ 8	+ 15	+ 8	+ 9	+ 15	- 2	- 28	- 40	- 14
Year	+ 26	+ 24	+ 20	+ 22	+ 24	+ 15	+ 1	- 22	- 66	- 103	- 113	- 14
Winter	- 7	- 4	- 5	+ 4	+ 15	+ 12	+ 13	+ 1	- 20	- 50	- 57	- 14
Equinox	+ 38	+ 37	+ 35	+ 35	+ 34	+ 32	+ 24	- 2	- 65	- 120	- 143	- 14
Summer	+ 47	+ 40	+ 30	+ 27	+ 24	0	- 31	- 64	- 112	- 140	- 140	- 14

L. L. MOUTH INCLINATION.

(31)

3	14	15	16	17	18	19	20	21	22	23	24	Range.
14	+ 28	+ 14	+ 9	+ 10	+ 14	+ 22	+ 21	+ 17	+ 14	+ 5	+ 6	81
13	+ 33	+ 31	+ 8	— 4	+ 20	+ 20	+ 20	+ 23	+ 12	— 2	— 5	84
23	— 6	— 2	+ 8	+ 15	+ 9	+ 9	+ 26	+ 20	+ 19	+ 22	+ 24	122
130	— 57	— 5	+ 38	+ 63	+ 57	+ 75	+ 66	+ 70	+ 57	+ 56	+ 53	251
72	— 28	+ 4	+ 26	+ 47	+ 76	+ 86	+ 92	+ 84	+ 67	+ 53	+ 43	244
113	— 70	— 32	+ 3	+ 48	+ 91	+ 119	+ 101	+ 92	+ 78	+ 58	+ 52	256
80	— 46	+ 17	+ 39	+ 56	+ 58	+ 61	+ 83	+ 73	+ 64	+ 47	+ 41	224
46	— 24	+ 25	+ 36	+ 23	+ 52	+ 49	+ 60	+ 55	+ 45	+ 64	+ 54	221
88	— 33	— 1	+ 21	+ 31	+ 38	+ 60	+ 67	+ 60	+ 45	+ 41	+ 47	221
103	— 58	— 17	+ 8	+ 7	+ 27	+ 48	+ 47	+ 44	+ 45	+ 49	+ 45	202
43	— 11	— 2	+ 13	+ 11	+ 28	+ 35	+ 35	+ 37	+ 18	+ 8	+ 7	125
5	+ 19	+ 6	— 2	+ 3	+ 3	+ 14	+ 13	+ 10	— 2	— 10	— 11	59
56	— 21	+ 3	+ 17	+ 26	+ 39	+ 50	+ 53	+ 49	+ 39	+ 33	+ 30	166
3	+ 17	+ 12	+ 7	+ 5	+ 16	+ 23	+ 22	+ 22	+ 11	0	— 1	80
86	— 39	— 6	+ 19	+ 29	+ 33	+ 48	+ 51	+ 48	+ 42	+ 42	+ 42	194
78	— 42	+ 4	+ 26	+ 44	+ 69	+ 79	+ 84	+ 76	+ 64	+ 56	+ 48	224

TABLE V.
MEAN MONTHLY AND ANNUAL VALUES.
FALMOUTH OBSERVATORY, 1912.

1912	Declination	Inclination	Horizontal Force	Total Force	North Component	West Component	Vertical Force
January ...	17 27.0	66 27.0	0.18808	0.47073	.17942	.05640	0.43154
February ...	17 28.0	66 26.7	0.18799	0.47041	.17932	.05642	0.43122
March ...	17 27.2	66 26.7	0.18804	0.47054	.17938	.05640	0.43134
April ...	17 25.9	66 26.9	0.18795	0.47038	.17932	.05630	0.43119
May ...	17 26.4	66 25.6	0.18815	0.47044	.17950	.05639	0.43122
June ...	17 24.4	66 26.9	0.18799	0.47047	.17938	.05624	0.43129
July ...	17 23.7	66 26.8	0.18798	0.47042	.17938	.05620	0.43122
August ...	17 23.0	66 27.2	0.18789	0.47032	.17931	.05614	0.43115
September ...	17 23.1	66 26.8	0.18800	0.47047	.17941	.05617	0.43126
October ...	17 20.7	66 27.3	0.18783	0.47020	.17929	.05600	0.43105
November ...	17 21.4	66 26.7	0.18782	0.47000	.17927	.05603	0.43082
December ...	17 19.4	66 24.7	0.18811	0.47008	.17958	.05601	0.43080
Year ...	17 24.2	66 26.6	0.18799	0.47037	.17938	.05622	0.43118

FALMOUTH OBSERVATORY.

Report of the Committee
WITH
METEOROLOGICAL TABLES
AND
Tables of Sea Temperature,

FOR THE YEAR 1913,

BY

WILSON LLOYD FOX, F.R. Met. Soc.

(Hon. Sec. Observatory Committee).

AND

JOSHUA BATH PHILLIPS

(Falmouth Observatory).

FALMOUTH :

Printed by J. H. LAKE & Co., Market Strand.

1914.

REPORT

OF THE

OBSERVATORY COMMITTEE

OF THE

Royal Cornwall Polytechnic Society

FOR THE YEAR 1913.

COMMITTEE : —

Mr. H. DYKE ACLAND, F.G.S.	Major LUARD, R.E.
Mr. HOWARD FOX, F.G.S.	Capt. ARTHUR ROGERS, R.N.R.
Mr. ROBERT FOX.	Mr. WALTER ROGERS, B.A.

Mr. WILSON LLOYD FOX, F.R. Met. Soc., *Hon. Sec.*

METEOROLOGICAL.

The work of this Department was, up to 30th June, 1913, conducted practically on the lines indicated by the Meteorological Office, when the present Observatory buildings were erected 29 years ago. Since the 1st of July modifications have been introduced, both as to the instruments employed and the methods of observation, with a view to the Observatory contributing to the data required in connection with the daily work in the study of the weather, conducted by the Meteorological Office; and also for the investigation of upper air currents and other atmospheric conditions for which "Pilot Balloons" are used whenever the weather is favourable. The

photographic recording Barograph and Thermograph have been superseded by a Dines Float-recording Barograph (the first of its kind to be used officially) with pen-attachment, by which the variations of barometric pressure are recorded on a cylinder and are constantly visible; and a pen-recording Thermograph for registering the changes of temperature; a "Richard" pen-recording hair Hygograph for registering Humidity. The Thermograph and Hygograph are placed in a separate Stevenson screen on the lawn, and when set run for 7 days. There have also been added to the equipment a Besson's Comb Nephoscope for observing the direction and velocity of clouds, and two earth Thermometers, one at a depth of one foot and the other at the depth of four feet underground; also a grass Minimum Thermometer. Observations are taken three times a day, viz., at 7 a.m., 1 p.m., and 6 p.m. G.M.T., being the hours of observation for the "Daily Weather Report." The Meteorological Committee appointed Mr. A. H. R. Goldie, M.A., to be the Meteorologist in charge, and he came into residence on the 1st of October. Mr. J. B. Phillips, who was in charge temporarily until the 30th of September, is now on the regular staff of the Meteorological Committee. Mr. R. G. K. Lempfert, M.A., Superintendent of the Forecast Division at the Meteorological Office, paid an official visit to the Observatory from the 26th to the 28th July.

Arrangements have been made by Dr. Shaw with the Falmouth Corporation by which reports of the weather are sent by telegram to the Meteorological Office at 6 p.m. daily. These appear in the "Daily Weather Report" and are included in the information communicated each evening to the Press.

The Meteorological observations hitherto taken for the Corporation of Falmouth by Mr. R. H. Brenton have been discontinued, and the Stevenson screen and instruments, which are the property of the Royal Cornwall Polytechnic Society, have been returned to your Committee. Mr. Brenton shares with Mr. Phillips the work of observing.

The outside of the Observatory and outbuildings were painted during September, and some minor repairs and decoration of the interior were carried out by Messrs. Blight and Sons.

A house is being erected against the northern boundary of the Observatory premises, with windows overlooking the garden. Your Committee considering this detrimental to the rights and interests of the Polytechnic Society as owners, are in negotiation for its protection.

The accounts, kept by the treasurer, Mr. W. W. J. Sharpe, have been audited by Messrs. R. Barclay Fox and E. P. Kestin, to whom your thanks are due.

Sea temperatures have continued to be taken by Capt. White, of the tug "Perran." Tables relating to these, prepared by your Honorary Secretary, will appear as heretofore in your Annual Report, together with Meteorological Tables supplied by Mr. J. B. Phillips, through the courtesy of the Meteorological Office.

The Press has been regularly supplied with Meteorological data, and information has been furnished in other directions when sought for.

Your Committee regret to report the resignation of their colleague, Mr. Walter Rogers, who has ceased to reside in this neighbourhood. An expression of their appreciation of his past valued services was sent to him.

MAGNETICAL.

The work of this Department, for which a generous grant of £150 was made by the Council of the Royal Society, which controls the Emergency Fund of the Government Grant Committee, was carried on as usual until the 30th June last. The monthly absolute observations have been reduced by Mr. Kitto, but owing to his departure and other circumstances referred to elsewhere, it has not been possible to deal further with the records for this period.

The Unifilar and Dip Circle employed in the making of Absolute Magnetic Observations have been, by request, returned to the Royal Society to be used in the projected Magnetic Survey of Great Britain.

The photographic self-recording magnetographs are for the present retained at the Observatory.

The Chronometer, lent by the Admiralty for use in making absolute Magnetic Observations, has been returned to the Royal Observatory at Greenwich.

Arising out of the suggestion made by Prof. H. Louis, M.A., D.Sc., in a paper which was contributed by him and read at your Summer Meeting, your Honorary Secretary prepared the accompanying table of the Declination of the Magnetic Needle at Falmouth, for the 25 years, 1888 to 1912 inclusive. This was circulated amongst engineers, surveyors, and others interested in the subject in Cornwall by your Secretary, Mr. E. W. Newton.

At the request of Dr. Louis A. Bauer, Director of the department of Terrestrial Magnetism of the Carnegie Institution at Washington, Mr. Wilfred C. Parkinson (formerly of Eskdalemuir), who had joined their staff, was afforded facilities at the Observatory from the 9th of June until the 2nd of July to accomplish certain work in connection with the magnetic observations, which Dr. Bauer required for purposes of comparison.

Mr. L. F. Richardson, B.A. (Superintendent-Elect of the Eskdalemuir Observatory) spent a week at the Observatory in July in making observations with the magnetic instruments there and comparing the results with those of his own instruments, prior to taking up his residence at Eskdalemuir.

The non-magnetic survey vessel "Carnegie," with Capt. W. J. Peters in command, and accompanied by a scientific staff, arrived at Falmouth on the 12th of September. Her previous visit was in November, 1909, when she made Falmouth her first port of call. In this her second voyage, which had taken her round the world, she made it her last port at which to call, prior to returning to New York. The staff made some land observations at the Observatory where every facility was afforded them, and also at a temporary station near Trefusis Point and at St. Anthony in Roseland. The "Carnegie" sailed on the 15th of October.

Your Committee received from the British Association, in September, a copy of the report adopted by the Committee appointed by the Council of the British Association to be

presented at its meeting in Birmingham on the 10th of September. This Report recommended (*inter alia*) that a magnetic survey of the British Isles should be repeated without delay. The former one was made under the auspices of the Royal Society between the years 1886 and 1896. It was also stated that whilst the Committee attached importance to the existence of a station in the South West it was of opinion, that if the survey were carried through rapidly, the maintenance of the observations at the Falmouth Observatory would not be essential.

In conclusion your Committee can only reiterate their sincere regret that owing to circumstances over which they had no control, it should have been found necessary to terminate the work of the magnetic department (which had been in continuous operation since 1887) as from the first of July last.

WILSON LLOYD FOX.

DECLINATION OF THE MAGNETIC NEEDLE (Falmouth.)

TABLE OF MEAN ANNUAL VALUES OF THE
MAGNETIC DECLINATION AT THE OBSERVATORY,
FALMOUTH, FOR THE 25 YEARS, 1888 TO 1912,
INCLUSIVE.

Year.	Declination.		Difference from previous year.
1888	||	19 35·2	
1889	||	19 30·2	5·0
1890	||	19 24·2	6·0
1891	*	19 18·3	5·9
1892	*	19 13·1	5·2
1893	*	19 6·5	6·6
1894	*	19 0·9	5·6
1895	*	18 54·5	6·4
1896	*	18 47·5	7·0
1897	*	18 42·2	5·3
1898	*	18 37·5	4·7
1899	*	18 32·7	4·8
1900	*	18 29·1	3·6
1901	*	18 25·5	3·6
1902	*	18 21·5	4·0
1903	*	18 18·3	3·2
1904	*	18 12·0	6·3
1905	*	18 8·4	3·6
1906	*	18 5·3	3·1
1907	*	18 0·4	4·9
1908	*	17 54·7	5·7
1909	*	17 48·4	6·3
1910	*	17 41·6	6·8
1911	*	17 33·0	8·6
1912	*	17 24·2	8·8

|| Mean of absolute observations.

* Mean of tabulated hourly values on "quiet" days.

It will be noticed that the Magnetic Declination in 1888 was 19 degs. 35·2 mins. W., and in 1912 it was 17 degs. 24·2 mins. W., being a difference in 25 years of 2 degs. 11·0 mins. W., or an average annual decrease of Westerly declination during 25 years of 5·2 mins. This decrease is irregular, ranging during the above named period between a maximum difference in 1912, of 8·8 mins. and a minimum of 3·1 mins. in 1906.

Table showing the Temperature of the Sea off Falmouth and in the centre of the Harbour during 1913, with the differences from the Air Temperatures taken at the Falmouth Observatory.

The Observations have been made by Captain White, of the steam tug "Perran," about one mile outside Falmouth Harbour, or in the centre of the Harbour.

1913.	Number of Daily Observations.	Means.	Difference from Air.	Absolute Maximum.	Difference from Air.	Absolute Minimum.	Difference from Air.	Monthly Range.	Difference from Air.	Means for 34 years, 1872 to 1885 and 1894 to 1913
		°	°	°	°	°	°	°	°	°
January	23	48·0	+2·9	49·5	-2·9	46·0	+12·3	8·5	-15·2	48·2
February	21	47·2	+3·4	49·0	-3·6	44·0	+13·4	5·0	-17·0	47·1
March ..	19	47·2	+1·1	48·5	-5·6	45·5	+11·7	3·0	-17·3	47·4
April	15	47·4	-0·7	49·5	-10·5	46·0	+8·7	3·5	-19·2	48·8
May	18	52·8	-0·3	54·0	-19·0	51·0	+9·0	3·0	-28·0	52·0
June	22	54·9	-0·8	60·0	-9·0	53·0	+6·6	7·0	-15·6	55·5
July	25	58·0	-2·2	62·0	-7·4	57·0	+8·3	5·0	-15·7	58·3
August ..	23	61·0	-0·6	63·0	-11·1	60·0	+14·3	3·0	-25·4	59·7
September	18	60·3	+1·7	61·0	-9·5	59·0	+12·6	2·0	-22·1	59·0
October	25	58·0	+4·0	59·5	-4·3	56·0	+17·4	3·5	-21·7	56·9
November	25	54·0	+4·6	56·0	-3·1	52·5	+14·8	3·5	-17·9	53·4
December	27	50·6	+6·1	53·0	-3·0	46·0	+18·1	7·0	-21·1	50·3
Means ..	22	53·3	+1·6	55·4	-7·4	51·3	+12·3	4·1	-19·7	53·1

Additional Sea Temperatures taken during 1913.

1913.		Place of Observation.	Temp-erature.	1913.		Place of Observation.	Temp-erature.
			°				°
January	7	Moorings	49·5	May	7	Moorings	50·5
"	8	Ditto	49·0	"	8	Ditto	50·0
"	9	Ditto	48·5	"	12	Ditto	51·0
"	10	Ditto	48·5	"	18	Ditto	51·0
February	12	Ditto	47·5	June	10	Ditto	53·5
March	8	Ditto	46·5	"	11	Ditto	53·5
"	10	Ditto	47·0	"	24	Ditto	56·0
"	15	Ditto	47·5	July	29	Ditto	62·0
April	3	Ditto	47·0	"	30	Ditto	61·0
"	4	Ditto	47·0	August	1	Ditto	62·5
May	5	Ditto	50·0	"	5	Ditto	62·5
"	6	Ditto	50·5	"	22	Ditto	61·5

FALMOUTH OBSERVATORY. LATITUDE 50° 9' 0" N.; LONGITUDE 5° 4' 35" W.
Height above mean sea level, 167 feet.

DATE.	PRESSURE OF AIR.						CLOUD, 0-10.		BRIGHT SUNSHINE.					
	Mean pressure of the Air.	Absolute Maximum.	Date of Maximum.	Absolute Minimum.	Date of Minimum.	Monthly Range.	Mean elastic force of Vapour.	I. II. III.	Number of hours of Bright Sunshine.	Greatest amount in one day.	Number of days on which Bright Sunshine occurred.	Percentage of Possible Duration.	Mean number of hours of Bright Sunshine for 30 years.	Mean number of days on which Bright Sunshine occurred in 1881-1910.
1913.														
January..	29-750	30-250	26	29-086	20	1-131	.263	7-3 7-1 5-6	55-4	4-6	21	21	58-2	20
February ..	30-161	30-684	12	29-537	1	1-127	.213	6-5 5-9 5-9	81-8	7-9	20	29	85-4	21
March ..	29-898	30-675	9	29-065	22	1-610	.262	7-1 7-2 4-1	119-7	10-3	24	33	141-1	27
April ..	29-861	30-283	9	29-110	27	1-183	.279	8-1 7-2 1-8	127-3	9-8	27	31	184-3	27
May ..	29-919	30-356	24	29-200	8	1-156	.332	6-3 5-9 5-8	211-9	13-4	31	45	232-1	29
June ..	30-150	30-515	28	29-765	5	0-749	.368	6-6 5-6 5-5	196-6	14-7	30	40	225-5	28
July ..	30-101	30-871	1	29-855	6	0-516	.425	5-8 5-0 1-8	241-1	13-8	30	49	223-9	29
August ..	30-084	30-326	12	29-733	30	0-593	.445	6-6 6-1 6-0	178-9	12-5	27	40	218-8	30
September ..	29-935	30-378	8	29-264	13	1-121	.433	7-4 7-1 6-5	121-3	10-6	23	31	162-8	27
October ..	29-793	30-389	13	28-941	29	1-448	.376	6-2 7-4 6-2	110-6	8-5	28	33	115-6	26
November ..	29-857	30-566	28	29-197	12	1-369	.522	6-1 7-5 7-2	73-1	6-1	26	27	74-8	22
December ..	30-188	30-714	31	29-412	3	1-272	.288	6-8 7-5 6-9	48-7	6-9	24	20	51-8	19
Totals and Means ..	29-984					1-107	.334	6-7 6-6 5-8	1566-7		311	33	1772-3	306

The readings of the Barometer have been reduced to 32° F. at mean sea level and Latitude 45°, and corrected for index error and capillarity. The mean monthly values are based on readings at 7 a.m., 1 p.m. and 6 p.m. The extreme Maxima and Minima of barometric pressure are standardised barograph readings. The records of bright sunshine are from the Campbell-Stokes Sunshine Recorder. The instruments in use are the property of the Meteorological Office, London, by whose permission the results are published.

FALMOUTH OBSERVATORY.

LATITUDE 50° 9' 0" N.; LONGITUDE 5° 4' 35" W.

Height above mean sea level, 167 feet.

DATE.		TEMPERATURE OF AIR.								HYGROMETRIC CONDITION.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
		Mean of daily				Monthly range.				Dry Bulb.				Depression of Wet.				Humidity. Complete Saturation = 100.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
		Maximum and Minimum.	Maxima.	Minima.	Mean daily range.	Absolute Maximum.	Date of Maximum.	Absolute Minimum.	Date of Minimum.	I.				II.				III.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
1913.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	</

The data for January to June are from the photographic curves of the self-recording Thermograph. The data for July to December are from Thermometers divided on the stem and verified and placed in a Stevenson Screen at a height of 4 feet over grass. The mean values in columns marked I., II., III. are based on readings at 7 a.m., 1 p.m. and 6 p.m. The instruments in use are the property of the Meteorological Office, London, by whose permission the results are published.

FALMOUTH OBSERVATORY. LATITUDE 50° 9' 0" N.; LONGITUDE 5° 4' 35" W.
Height above mean sea level, 167 feet.

DATE.		WIND.							RAIN.							
		Relative proportion of				Mean velocity in miles per hour.	Maximum velocity during one hour.	Date and hour of Maximum velocity.	Direction of Maximum velocity.	Mean pressure in lbs. per sq. foot.	Maximum pressure lbs. per sq. foot.	Rain in inches.	Mean for 40 years, 1871—1910.	No. of rainy days.	Mean No. of rainy days for 40 years, 1871—1910.	
																N	E	S	W
January	.. .. .	4	2	12	13	14	2	38	20th, noon	W S W	1.01	7.22	7.36	4.65	29	20
February	.. .. .	7	7	9	5	12.9	40	44	7th, 1, 2 p.m.	S S W	0.83	8.00	1.78	3.67	9	17
March	.. .. .	4	14	10	3	17.1	36	44	3rd, 11 a.m.	S W	1.46	9.68	4.89	3.28	23	17
April	.. .. .	8	4	8	10	14.1	38	44	26th, 11 a.m.	S S W	1.03	7.22	5.47	2.83	21	16
May	.. .. .	8	3	11	9	12.2	44	44	8th, 11 a.m.	S S W	0.74	9.68	3.73	2.26	19	13
June	.. .. .	8	3	6	13	10.1	34	34	10th, 3, 4 a.m.	S W	0.51	5.78	1.40	2.40	13	11
July	.. .. .	15	5	4	7	9.3	25	25	7th, 4, 5 p.m.	N	0.43	8.12	0.31	3.03	6	16
August	.. .. .	14	6	4	7	6.9	30	30	22nd, 11 a.m.	S W	0.24	4.50	1.13	3.39	10	17
September	.. .. .	11	8	6	5	7.5	27	27	14th, 11 a.m.	W S W	0.28	3.64	2.47	3.46	17	16
October	.. .. .	3	6	14	8	9.3	27	27	{ 7th, 11 a.m. 29th, 8 p.m.	{ S S E S W	0.43	3.64	5.43	5.37	18	21
November	.. .. .	5	1	7	17	13.4	38	38	18th, 11 a.m.	W S W	0.90	7.22	5.79	5.19	24	19
December	.. .. .	11	4	3	13	13.2	41	41	26th, 11 p.m.	W S W	0.87	8.40	5.42	5.81	18	22
Totals and Means		98	63	94	110	11.7					0.73		45.28 3.77	43.08 3.76	207 17	208 17

The direction and velocity of the wind are obtained from the continuous curves of the self-recording Robinson Anemometer, the cups of which are 43 feet above the ground. The Rainfall is from the 11 inch self-recording Bröckley gauge, 2 feet above the ground. The number of Rainy Days is that on which 0.01 inch, or more, of rain was recorded. The Wind and Rainfall values are derived from the daily continuous records 1 a.m. to midnight. The instruments in use are the property of the Meteorological Office, London, by whose permission the results are published.

PRIZE LIST, 1914.

ROYAL



CORNWALL

Polytechnic Society

FOR THE

Encouragement of Science and the Fine and
Industrial Arts.

INSTITUTED 1833.

PATRON:

HIS MOST GRACIOUS MAJESTY THE KING.

VICE-PATRON:

HIS ROYAL HIGHNESS THE DUKE OF CORNWALL, K.G.

PRESIDENT:

LORD ST. LEVAN.

VICE-PRESIDENTS:

Hon. T. C. R. Agar Robartes, M.P.

C. S. Goldman, M.P.

Henry Jenner, F.S.A.

Commander Arthur Rogers, R.N.R.

The Rev. Canon T. Sikes Hichens

W. C. Stephens

Capt. W. F. Tremayne

The Lord Bishop of Truro

George T. Holloway, M. Inst. M.M.,
F.I.C.

Bedford McNeill, F.G.S., Pres. Inst.,
M.M.

F. J. Stephens, F.G.S., M. Inst.,
M.M.

Percival D. Williams.

SECRETARY:

EDWARD W. NEWTON, F.G.S.

Royal Cornwall Polytechnic Society.

Instituted 1833.

PATRON :

His Most Gracious Majesty the King.

VICE-PATRON :

His Royal Highness The Duke of Cornwall, K.G.

PRESIDENT :

Lord St. Levan.

SEVENTY - FOURTH
EXHIBITION

TO BE HELD AT THE

The Public Hall Buildings, St. Austell,
From Tuesday, August 25th to Saturday 29th (inclusive).

Certified by the Board of Trade as an Industrial Exhibition for the purposes of the Patent and Designs Act, 1907. (See pages 15 and 16.)

SPECIAL FEATURE FOR 1914.

Machinery and Appliances adapted for
The Mining and Preparation of
CHINA CLAY.

The Royal Cornwall Polytechnic Society has been established over eighty years, and affords the best opportunity for making known the merits of Inventions, etc., throughout the West of England ; and also affords special facilities to Mining and Engineering Students for the Study of New Machinery, etc.

REGULATIONS FOR COMPETITION.

Notice to Exhibitors.

1. Persons who wish their exhibits judged with the view of obtaining an award must pay a fee of 3/-. This will entitle the exhibitor to a non-transferable ticket admitting once to the Exhibition. Members of the Society, of the working classes, and persons under 16 years of age, are exempt from this fee. A charge for space is made to business firms.
2. No exhibitor will be able to obtain an award for any article which has been exhibited at a previous exhibition of the Society unless it shows some special new feature worthy in itself of an award
3. Silver medals may be awarded for single exhibits which are in the opinion of the Judges of special value, either scientifically or artistically. The Judges may award a Bronze medal for any meritorious or less important exhibit, also for specimens of superior workmanship. Certificates of Merit may also be given. In some classes specified on the Prize List money prizes may be awarded.
4. Diplomas of Honour and Diplomas of Merit will be awarded to Trade exhibits. Exhibitors are not excluded from the award of a Silver or Bronze medal for a special object as specified in Rule 3.
5. The Council reserves the right to exclude any exhibit for which space cannot be conveniently found, or which they may deem unworthy of exhibition.
6. The Council and Judges may decline to make an award. Their decisions are final.
7. Exhibitors may be called upon to certify that the articles exhibited by them are their sole work.
8. Every exhibitor must fill, sign and return the Entry form, to be obtained from the Secretary, before his exhibit can be received by the Society.
9. This Entry Form must in all cases be returned to the Secretary on or before 18th August.
10. The Society charges a commission of 5% on all articles sold from or through the exhibition.
11. The Council reserves the right to extend the duration of the Exhibition, if they think it necessary.
12. No exhibits to be removed until the close of the Exhibition unless the special permission of the Secretary is obtained.

China Clay and China Stone.

DIPLOMAS AND MEDALS

are offered by the Society for Exhibits, Inventions and improvements
(see Regulations for Exhibitors) for the following :

- A.—Machinery and appliances adapted to the winning and preparation of China Clay and China Stone including models.

In connection with this class it is the Council's desire that special attention shall be given to :—

Pumping Machinery, Hauling Machinery,
Water Extracting Machinery,
Processes of Hydraulic Washing,
Processes of Drying,
Transportation of Waste Products, etc.

- B.—Models illustrating methods for the production of China Clay.

- C.—Exhibits illustrating the uses of China Clay, etc.

- D.—New purposes to which China Clay may be applied.

- E.—Papers on subjects connected with the China Clay Industry, including statistics showing the growth of the Industry.

- F.—Purposes for which the bye-products of China Clay may be applied.

N.B.—The loan of Pictures and Engravings of China Clay Works, or any subject connected with the Industry is invited by the Council.

Applied Chemistry.

- A.—Exhibits illustrating the application of Chemistry to the Arts and Manufactures.

- B.—Scientific Papers dealing with the above subject.

Mechanics.

BOARD OF TRADE CERTIFICATE granted under the provisions of the PATENTS, DESIGNS and TRADE MARKS ACT, 1907.

NOTE. Exhibitors desirous of availing themselves of the protection afforded by Sections 45 and 59 of the above Act, should, before exhibiting their inventions or designs, or articles to which designs are applied, or publishing a description of such designs, give the Comptroller the prescribed notice of their intention to do so. (See page 16). This also applies to Exhibits specified on preceding page.

MEDALS AND AWARDS

are offered by the Society for :—

- 1.—Inventions and Improvements in Machinery.
- 2.—Electrical Machinery of all descriptions, including:
Dynamos, Electro-motors, Transformers,
Switchboards, etc., etc.
- 3.—Electrical Mining Machinery.
- 4.—Household Electrical Appliances.
- 5.—Electric Signs and Novelties.
- 6.—Electric Measuring Instruments.
- 7.—Improvements in Electric Lamps.
- 8.—Ventilation and Sanitation Appliances.
- 9.—Mechanical Drawings and Models.
- 10.—Specimens of Workmanship by Workmen or Apprentices.
- 11.—Essays and Scientific Papers.
These must be easily legible and plainly written or typewritten, and sent to the SECRETARY at least **three weeks** before the exhibition opens.
- 12.—Surveying Plans.

These should be accompanied with the Working and Traverse Notes of the Survey; and it must be distinctly stated whether the plans are original or copies, and, in the case of a Student, it declared to be original they should be vouched for by his Teacher.

NOTE.—The Essays should, where practicable be accompanied by Maps, Plans, Models or Specimens.

Fine Arts.

Professional Artists

are invited to send their Works for Exhibition and on Sale.

The Art Union of Cornwall selects its Prizes
from these Pictures.

Amateurs.

Section I.—SCULPTURE

Section II.—OIL PAINTINGS AND WATER COLOURS.

Medals are offered in the following Subjects :—

1. For original Figure Subject, in Oil or Water Colour.
2. For original Landscape or Seascape, in Oil.
3. For original Landscape or Seascape, in Water Colour.
4. For original Study of Flowers or Still Life, in Oil.
5. For original Study of Flowers or Still Life, in Water Colour.
6. For China Painting, original design.

NOTE.—All persons who have ever sold a Picture from an Exhibition shall be deemed *Professional*.

Section III.—ENGRAVING AND ETCHING—LITHOGRAPHY, &c.

Section IV.—BLACK AND WHITE.

PREMIUMS.

£1 to persons under 20 years of age, in each of the
following subjects :—

1. Six Flowers, Leaves, or Animals from Nature.
2. Shaded Drawing from the Bust.
3. Studies of Boats, Fishing Luggers, Trawlers, etc.

Prizes of 10s. and 7s. 6d. for Drawings of Flowers, and
other objects, from Nature, by persons under 16 years of age.

The age to be stated in all cases.

Photography.

No distinction is made between Amateur and Professional Photographers.

All Exhibits must be entirely the work of the Exhibitor, framing only excepted: and in enlargements the original negative also must have been taken by Exhibitor.

The Exhibitor's name and address, the title of the picture, the process employed, the class for which it is entered, and the price, if for sale, must be clearly written on the back of the frame, but no name or other matter except title of picture on front.

Medals and Diplomas will be awarded at the discretion of the Judges.



Section A.—PICTORIAL PHOTOGRAPHY—

Class 1.—LANDSCAPE, MARINE & RIVER SCENERY.

„ 2.—PORTRAITURE AND FIGURE STUDIES.

„ 3.—ARCHITECTURE.

„ 4.—STILL LIFE, FLOWERS AND ANIMAL STUDIES.

„ 5.—PHOTOGRAPHS OR LANTERN SLIDES OF CHINA CLAY WORKS.

„ 6.—DEVON AND CORNWALL SCENERY
(*Open to Residents of these Counties Only*).

„ 7.—ANY SUBJECT NOT INCLUDED IN ABOVE CLASSES.

Section B.—TECHNICAL PHOTOGRAPHY—

Class 1.—TECHNICAL PHOTOGRAPHS.

„ 2.—SCIENTIFIC AND TECHNICAL APPLICATION OF PHOTOGRAPHY.

Section C.—COLOUR PHOTOGRAPHY & LANTERN SLIDES.

Section D.—APPARATUS AND TRADE EXHIBITS.

All information respecting this Department and Entry Forms may be obtained from the Secretary:—

E. W. NEWTON,
CAMBORNE, Cornwall.

Ornamental Art.

MEDALS AND AWARDS

are offered for Exhibits under the following heads :

Wood Carving	.....	High and Low Relief.	.
Metal Work	.....	Silver, Iron, Brass, Copper and Pewter.	
„	„	Reponssè.	
Pottery	.....	Making and Decoration.	
„	.....	Modelling in Relief and Casting.	
„	.....	Throwing of Object.	
Bookbinding	.....	Workmanship, Design and Ornament.	
Leather Work	.....	Embossed and Incised.	
Design	.....	Furniture, Wall Hangings, Stained Glass, Inlay, &c.	

Lace Making & Art Needlework Sections.

Lace Making	.....	Work and Design.	
Art Needlework	.....	Ecclesiastical and other Embroidery. Appliqué, &c. Work and Design.	

NOTE.—All Exhibits may be priced for Sale.

Natural History.

All Papers in this Section must be sent to the Secretary at least three weeks before the Exhibition commences.

Medals and awards will be given for excellence in the following subjects.—

1.—MINERALOGY AND GEOLOGY.

Collections of Minerals or Rocks illustrating a particular district.

Collections of Minerals or Rocks illustrating the minerals and Rocks of Cornwall.

Collections of Specimens of China Clay, China Stone and their associated Minerals and Rocks.

2.—ORIGINAL PAPERS, illustrated by pen and ink sketches or by photographs, on the Natural History of a Cornish lane, hedgebank, wood, moor, wayside or moorland pool, or portion of coast, with carefully preserved specimens of some of the more interesting objects described.

It is particularly desired that naturalists who intend exhibiting should take up the study of some well-defined natural area like the Towans, Goonhilly Downs, the Bodmin Moors, Mount's Bay, the Fal, the Looe Valleys, the Gannel, Bishop's Wood, Swanpool or Marazion Marshes.

3.—Carefully Labelled BOTANICAL COLLECTIONS from well defined portions of the County.

Though general collections will be gladly welcomed, naturalists will find it in most cases more profitable to send in special exhibits such as Flowering Plants, Vascular Cryptograms, Mosses, Hepatics, Lichens, Marine Alga, Spiders, Crustacea, Hydroids, Butterflies and Moths, Beetles, Lacewings, Ichneumons and Flies.

The value of the work in Section 2 and 3 would be greatly enhanced if it were in each case accompanied by a tracing from the Surrey Map showing the area of collection.

4.—COLLECTIONS of MICROSCOPIC SLIDES of a definite character to illustrate the minute fauna or flora of the county. Diatoms, desmids and foraminifera are suggested as suitable subjects, but the Exhibitor is by no means limited in his choice to one of these. General collections however are not recommended.

“Lander” Prizes.

These Prizes are called “Lander” Prizes in Commemoration of those enterprising Cornish travellers, Richard and John Lander.

Competitors must be under 18 years of age : the age to be stated.

The work not to be done during School hours.

Subject for 1914 :—

“MEXICO.”

MR. ROBERT FOX offers to the Society Prizes to the total amount of £2 for Essays on the above subject, illustrated by neat and correct Maps.

SUGGESTIONS TO COMPETITORS

1. Describe the Physical Characters of the Country—Mountain Ranges, Rivers, Lakes, etc.
2. When and how did it become a Spanish Colony?
3. When did it regain its independence.
4. Give some account of its products—Natural, and by Cultivation.
5. Name and describe briefly the principal Towns and Seaports.
6. Describe the inhabitants their life, customs and habits.
7. Describe the Climate.

A correct Outline Map, if the Essay be incorrect or inadequate, to be entitled to one-half of the relative prize, and *vice versa* as to good Essays but imperfect Maps. Authorities, where quoted, should be mentioned.

NOTE.—The Maps, as well as the Essays, must be signed with the Competitor's Name, Age, and Address.

Maps (which should be mounted on rollers) and Essays (not to exceed 20 pages) must be sent to the Secretary **One Week** before the Exhibition.

Papers on Cornish Parishes.

Medals and Diplomas are offered for Collections of notes, historical, archaeological, or scientific on any parish in Cornwall, to be illustrated if possible by photographs.

These should be sent to the Secretary at least **three weeks** before the Exhibition opens, and it would be preferable if they were typewritten.

Shorthand.

Competitors must be under 25 years of age, the age to be stated.

PRIZES to the total amount of £3 for proficiency in the use of Shorthand, to *non-professional* writers of it, resident in Cornwall or Devon. The skill of the candidates to be tested by their several readiness and accuracy in taking down passages from a book or newspaper read in their presence at the rate of 80 words a minute, and afterwards giving a copy of the Shorthand in ordinary writing. Any system may be used.

NOTE.—Competitors to be in attendance at the Public Hall, St. Austell, on Monday, August 25th, at 3 p.m.

Typewriting.

Competitors must be under 21 years of age, the age to be stated.

PRIZES to the total amount of £3 for typewriting: open to residents in Cornwall and Devon.

Operators may use any kind of machine, the award being decided by (1) accuracy; (2) speed; (3) neatness and punctuation.

Competitors must provide their own machines.

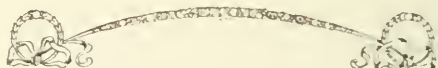
NOTE.—Competitors to be in attendance at the Public Hall, St. Austell, on Monday, August 25th, at 3.30 p.m.

Teachers, and those interested in selling machines, are ineligible for this competition.

Cornwall County Council.



With a view to encourage Students in the Classes under the Technical Instruction Committee of the Cornwall County Council, Medals and Diplomas are offered by them in various subjects.



Conditions—In the Sections every Competitor shall be a Student in a class for instruction on the subject for which he is competing, held under the County Technical Instruction Committee.

The Teacher, in each case, to certify that the work sent has been done solely by the Competitor.

For List of Subjects, Entry Forms, and any further information, apply to Mr. JOHN GILL, F.C.S., Secretary for Higher Education, Gwealhellis, Helston.



The Art Union of Cornwall

(Under the Sanction of the Board of Trade).

Selects its Prizes from the Works exhibited
by Professional Artists.

THE DRAWING FOR PRIZES

WILL TAKE PLACE AT THE

**PUBLIC HALL, ST. AUSTELL,
ON FRIDAY, AUGUST 28th, 1914,**

AT 9 P.M.

Books of Tickets and all information respecting
the Art Union may be obtained of the Hon. Secretary
of the Art Union, E. J. MOSELEY, Falmouth, or the
Secretary:—

EDWARD W. NEWTON,

Camborne.

EXHIBITION CATALOGUE.

Advertisements are invited for publication
in above Catalogue.

SCALE OF CHARGES:

Whole Page (body)	20/-	Covers—	
Half Page	12/-	Outside Page (back)	£5
Quarter Page	7/-	Inside Pages	£1 10s.

Inserting Handbills—leaf throughout 15/-

Cash *with* order. Blocks received for insertion.

The size of the Advertisement Page is 6½ inches by 4 inches.

*All communications and copy for Advertisements to be sent
not later than August 18th, to the*

Secretary, E. W. NEWTON,

Camborne,

or the

Assistant Secretary, E. J. MOSELEY,

20, Church Street, Falmouth.

BOARD OF TRADE,
(COMMERCIAL DEPARTMENT).
GWYDYR HOUSE,
WHITEHALL,
LONDON, S.W.,
23rd March, 1914.

Sir,

With reference to your letter of the 7th March, I am directed by the Board of Trade to transmit to you herewith a Certificate, under the provisions of the Patents and Designs Act, 1907, in respect of the 74th Exhibition of the Royal Cornwall Polytechnic Society proposed to be held this year at St. Austell.

I am, at the same time, to enclose, for your information, a print of Sections 45 (1) and 59 (1) of the Act in question, and to point out that it is necessary that exhibitors desirous of availing themselves of the protection afforded by those Sections should, before exhibiting their inventions or designs, or articles to which designs are applied, or publishing a description of such designs, give the Comptroller General of Patents, Designs and Trade Marks the prescribed notice of their intention to do so.

The attention of exhibitors should, therefore, be called to this requirement.

I am further to ask you to be good enough, in order to avoid misconstruction, to state, in any reference to this certificate in your prospectus or in any other papers you may issue, that the Exhibition is "Certified by the Board of Trade as an Industrial Exhibition for the purposes of the Patents and Designs Act, 1907."

I am, Sir,
Your obedient Servant,
GEO. J. STANLEY.

E. W. NEWTON Esq., F.G.S.,
Royal Cornwall Polytechnic Society,
Camborne,
Cornwall.

PATENTS AND DESIGNS ACT, 1907.

Upon the application of Mr. E. W. Newton, of Camborne, Cornwall, made to the Board of Trade on the 7th day of March, 1914, the Board of Trade do hereby certify, for the purposes of the Patents and Designs Act, 1907, that the Seventy-fourth Exhibition of the Royal Cornwall Polytechnic Society, proposed to be held in the year 1914, at St. Austell, in the County of Cornwall, is an Industrial Exhibition.

Signed by order of the Board of Trade, this twenty-third day of March, 1914.

GEO. J. STANLEY,
An Assistant Secretary to the Board of Trade.

THE BOARD OF TRADE CERTIFICATE ,

*Under the provisions of the Patents and Designs Act, 1907,
and granted the 23rd day of March 1914.*

PART I. PATENTS.

Provisions as
to Exhibitions.

Patents and Designs Act, 1907.

SECTION 45 (1). The exhibition of an invention at an industrial or international exhibition, certified as such by the Board of Trade, or the publication of any description of the invention during the period of the holding of the exhibition, or the use of the invention for the purpose of the exhibition in the place where the exhibition is held, or the use of the invention during the period of the holding of the exhibition by any person elsewhere, without the privity or consent of the inventor, shall not prejudice the right of the inventor to apply for and obtain a patent in respect of the invention or the validity of any patent granted on the application, provided that :—

- (a) The exhibitor, before exhibiting the invention, gives the Comptroller the prescribed notice of his intention to do so; and
- (b) The application for a patent is made before or within six months from the date of the opening of the exhibition.

PART II. DESIGNS.

Provisions as
to Exhibitions.

SECTION 59 (1). The exhibition at an industrial or international exhibition, certified as such by the Board of Trade, or the exhibition elsewhere during the period of the holding of the exhibition, without the privity or consent of the proprietor of a design, or of any article to which a design is applied, or the publication, during the holding of any such exhibition, of a description of a design, shall not prevent the design from being registered, or invalidate the registration thereof, provided that :—

- (a) The exhibitor, before exhibiting the design or article, or publishing a description of the design, gives the Comptroller the prescribed notice of his intention to do so; and
- (b) The application for registration is made before or within six months from the date of the opening of the exhibition.



